New York
State College of Agriculture
At Cornell University
Ithaca, N. Y.

Library
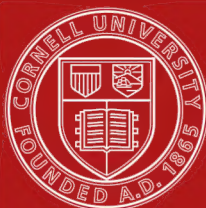
CLINICAL
LECTURES AND REPORTS,

BY THE

MEDICAL AND SURGICAL STAFF

OF

THE LONDON HOSPITAL.

WITH AN APPENDIX
ON THE RECENT EPIDEMIC OF CHOLERA.

VOL. III.—1866.

TABLE OF CONTENTS.

LIST OF ILLUSTRATIONS.

LIGATURE OF THE EXTERNAL ILIAC ARTERY FOR FEMORAL ANEURISM,

WITH CLINICAL REMARKS,

By JOHN ADAMS, F.R.C.S.

(Notes of the Case by C. B. Sweeting.)

HARRIET J. aged 53, was admitted in consequence of a large pulsating swelling in the upper femoral region of the left side. She stated that three years ago she received a kick in the left groin, and that shortly after she perceived a swelling, of the size of a hazelnut, in the situation corresponding to that of the femoral artery below Poupart's ligament. The swelling remained stationary, until three months ago, when it enlarged suddenly, and she experienced great pain in it, the pain extending down her leg : her leg became œdematous and discoloured by distension of the minute veins. She gradually lost her appetite, and became very unwell.

On examination, an aneurism of the femoral artery was distinctly felt. The sac was circumscribed below Poupart's ligament, but it extended upwards beneath the abdominal walls in the course of the external iliac artery, where it became more diffused, but could still be felt pulsating. The pulsation could be seen and felt in all parts of the swelling, and the diagnosis was as clear as possible. Mr. Adams and his colleagues urged the immediate application of the ligature on the external iliac artery, but she objected ; she was, therefore, sent to bed ; her limb was placed on an inclined plane with her heel raised, and a gently supporting bandage was applied from the foot to the groin. After two days' rest the artery was tied. It was requisite to make a very long incision, as the tumour extended

B

upwards a great distance, and the woman was excessively fat.   The
incision was begun about an inch to the left of the umbilicus, and
was carried down about five inches so as to impinge opposite the
middle of Poupart's ligament ; it had a slight concavity towards the
middle line : the layers of the diverse structures, which are met with
in this operation, were cautiously divided ; the fascia transversalis
was separated from the peritonæum, and the latter was carefully
drawn upwards and inwards, and the ligature was placed around the
external iliac artery with the usual precaution of opening the sheath
with left fore-finger nail, and passing the aneurismal needle from
within outwards, so as to avoid the vein.

All pulsation ceased at once in the tumour, a few silk ligatures
through the skin were employed to retain the edges of the wound
together, and the more complete adjustment of the parts was
accomplishment by strips of plaster.

The whole limb was enveloped in carded wool, and was placed in
a completely horizontal position.   Thirty drops of laudanum were
given, and she took four ounces of wine.

The pulse after the operation was 120 in the minute : the
temperature of the foot was very low, and immediately after the
operation a perceptible diminution took place in the swelling of the
entire limb.

The operation was performed on the 17th of November, and on
the 18th, there was fever and great pain in the abdomen ; the pulse
was now 115, but towards evening these symptoms remitted.   On
the 19th the œdema had much diminished ; the temperature of the
foot had increased, and the general condition was good.   Her pulse
had sunk to 96.   The diet was sustaining without stimulus.   On
the escape of a large quantity of pus, with a strong gaseous smell,
from the wound, a poultice was applied, and a more stimulating diet
was given.

There was nothing of essential moment to record in her progress,
which continued almost uninterruptedly good : she had retention of
urine, for which the catheter was used.   Slight attempts were made
to remove the ligature from time to time, but it came away spon-
taneously, and was found loose in the discharge on the 16th of
December, one month from the time of the operation.

The wound healed very slowly, but pulsation in the tumour

never returned, so long as she was under observation in the Hospital.

She went home home, on the 10th of January, at her own request, the wound being almost closed : but her subsequent history is this : the tumour began to be painful and soft, fluctuation could be distinguished, and she died after two or three attacks of arterial hæmorrhage which appeared to come from the lower part of the artery—no examination of the body was obtained. It was well known that the woman was a free and irregular liver and habituated to ardent spirits.

GENTLEMEN,—I do not say that there is anything of especial importance in this case demanding a lengthened discussion, but there are some points of interest requiring a few observations. Let us first consider what the nature of the case is; in other words, where did the aneurism begin, and what is its real character? The history of the case leads us to the conclusion that the aneurismal swelling began in the femoral artery, just where the vessel passes under Poupart's ligament, and where, from being the external iliac, it assumes the name of femoral. Although the line of distinction is arbitrary, still it is requisite that these anatomical landmarks should always be retained, especially where they concern the large arteries of the body.

The further history is, that the disease originated from a kick; and here we may object that this poor woman's account of her case cannot be depended on; and the reason why we may demur to the truth of the history is, that the disease remained three years in abeyance, a mere swelling existing at the seat of injury. But I should be sorry to exclude all evidence of this description in studying this case, for the effect of a severe blow or kick would be very likely to damage the coats of an artery, especially where the inner and middle coats are rendered brittle by age and the changes resulting from age and irregular living. I dare say you are well aware, that if you take even an healthy artery and roll it between your finger and thumb, you at once form an aneurism ; at least this is the case in animals. Presuming, therefore, that the aneurism did begin in consequence of a blow, shall we call it a traumatic aneurism? Certainly not; for the term traumatic is only given to aneurisms

where the coats of an artery have been divided, and where the aneurism is the consequence of that remarkable distension of the organized material which glues up the opening in the artery, or where the bursting of the sac occurs after a wound, and the blood becomes diffused into the adjacent parts. These two cases come under one peculiar category, and demand appropriate treatment, and such as was not pursued in the case before us. The disease was obviously making very rapid progress, but the aneurism was still circumscribed, and the operation was decided on, but delayed at the wish of the patient. No harm, fortunately, resulted from this delay, and, although no time is to be wasted by the vain endeavours to cure by pressure, or other means, such cases as the present, yet in an Hospital like this, where a patient can be watched from hour to hour, we can pause a little, as I did in this very case, and, as in this instance, not only no inconvenience, but actual benefit may result.

A case occurred here some years ago to our consulting surgeon, Mr. Luke, bearing on this point. Mr. Luke was contemplating the application of a ligature in a case of femoral aneurism, but he ordered a bandage to be applied somewhat compressively to the swelling. On the following day all pulsation ceased in the tumour, and the patient was cured without operation. It is highly probable that a clot of blood was detached here, which filled the artery at the seat of the aneurism, and thus effected a cure.

In cases parallel to the present, where the swelling extends into the abdomen, you cannot well apply pressure sufficiently long as to induce those changes which are essential to cure—I mean the coagution of the blood in the sac, &c. It is true that the aorta may be compressed, as it passes over the lumbar vertebræ, either by the fingers or by a tourniquet, as has been lately advised by Mr. Syme, and Mr. Lister. Indeed it is well-known that Baudelocque did this in a case of uterine hæmorrhage, and saved a patient's life by this means; and you will find a case recorded in the *Medical Gazette*, October 31st, 1835, where this plan was successfully followed by a student, in a case of wounded femoral artery; yet here it would have been obviously improper to attempt any other plan than the simple application of the ligature, as the disease was making such rapid advances as to threaten the supply of blood to the entire limb. If you are interested about the application of pressure to the abdominal

aorta, you had better consult a paper on this subject by M. Chailly Honoré, in the *Bulletin de l'Academie* xvi., p. 731.

It may be a little interesting to us to know that the operation of tying the external iliac artery was first performed by a student of this Hospital, the late Mr. Abernethy, of St. Bartholomew's Hospital, who studied surgery here under Sir William Blizard. His first and second operations were unsuccessful, but the third case was cured by the operation, and it became an established operation in surgery. Very trifling modifications have been made in the operation since Mr. Abernethy first tied the artery in 1796, and usually it is one of comparative facility.

In this case there was a very large quantity of fat under the skin, and between the muscles, but that important structure, the fascia transversalis, was easily made out, and was carefully divided on a director; the peritonæum was pushed aside, and the artery was readily secured.

The subsequent advance of this case after the patient left the Hospital, should make us pause, ere we congratulate ourselves on the success of our operations; and it becomes me to consider the case further, and to point out to you what practice should be followed in parallel instances, where hæmorrhage occurs after the ligatures have come away. I may say that the source of hæmorrhage under such circumstances is always that part of the artery below the ligature, and where it is most likely that the repair by cohesion of the arterial tunics does not progress satisfactorily. If this be true therefore, it is at once clear that any further use of the ligature to the artery above is futile. What then is to be done? Pressure and ice may be employed over the aneurism, internal stiptics are useless, but sponge, soaked with a solution of perchloride of iron, may be stuffed into the wound, and then pressure and ice may be used; but failing these, as is very likely to be the case, you must adopt the bold and decisive practice of laying open the tumour; turning out the clots, and having found the lower orifice of the artery, insert your finger into the opening, and direct your assistant to pass an armed aneurismal needle around the blood-vessel below your finger, and the case is as safe as you can make it.

ON SPECTRUM ANALYSIS,

IN RELATION TO CHEMISTRY, PATHOLOGY, AND MEDICAL JURISPRUDENCE,

By H. LETHEBY, M.B., M.A., Ph. D., &c.

LECTURER ON CHEMISTRY AT THE LONDON HOSPITAL COLLEGE.*

THE subject of Spectrum analysis, with its numerous applications to practical science, has lately assumed so much importance, because of its strikingly characteristic results, that it deserves something more than a passing notice; and seeing how large a function it may yet perform in unravelling some of the mysterious phenomena of life, and in determining the nature, if not the cause, of many pathological changes, it is surely worthy of the closest attention of the medical practitioner.

And in order that the leading facts and principles of the inquiry may be clearly understood, and followed throughout their various details, I shall make no apology for entering more fully into it, than the mere question of medical science would at first sight seem to require.

In tracing back the history of the subject, we find that the first experiment relating to it was made in the year 1701, by Sir Isaac Newton—then Mr. Newton. He allowed a beam of sun-light to enter a dark room through a *circular* hole in a shutter, and by passing it through a triangular glass prism, somewhat like a pendant of a chandelier, which he placed near to the hole, he found that the beam, of light was not only turned out of its course by the refractive power

---

* This paper is an abstract of a lecture given by Dr. Letheby at the Medical College, with such additions to the subject as have been made since its delivery during the Winter Session.

of the glass, but was also broken up into colours, for it presented
the magnificent image of a rainbow with its seven prismatic tints.
This he called the *solar spectrum* ; and he noticed that the colours,
as in the rainbow, succeeded each other in regular order, although
blended by insensible gradations.   First in the series, and nearest to
the proper direction of the solar ray, was a brilliant red, then
followed orange, yellow, green, blue, indigo, and violet—the last
being the most disturbed from the right course of the beam, and
therefore the most refracted.

For more than a hundred years this experiment was repeated
without variation, and nothing was added to the discovery of
Newton, until Wollaston, in 1802, altered the form of the hole in
the shutter, by using a *narrow slit* instead of a *circular aperture.*
This produced a far more perfect spectrum ; and he was able to see
that the colours were intersected by dark bands or lines, which
had not before been observed.   He also examined the spectra of
different kinds of light, as the flame of a candle, and the electric
spark, and he noticed that the spectra differed very much from
each other—that from the electric spark being singularly im-
perfect, for it was composed of only a few of the prismatic colours.
We shall see hereafter that this, in reality, is the starting-point of
spectrum analysis.

In the year 1815, the remarkable lines of Wollaston were carefully
examined by a German optician named Fraunhofer, who, by fixing
the prism before the object-glass of a telescope, was able to magnify
the spectrum, and thus to see the dark lines much more distinctly
than Wollaston had done.   By this means he recognised and mapped
out the position of more than six hundred lines, distinguishing the
most important of them by capital letters of the alphabet, and the
least important by small letters.   He likewise ascertained that the
lines were not affected by the material of which the prism was
formed—for they appeared the same with all kinds of transparent
media, but they were much affected by the light made use of.

Twenty years later, namely, in the year 1835, Mr. Wheatstone
gave an account of the spectra which are produced by the prismatic
decomposition of the electric, voltaic, and electro-magnetic sparks ;
and he described the singular and characteristic appearances of dif-
ferent spectra when the sparks were taken from different metals.

That from mercury, for example, he said consists of seven definite rays only, separated from each other by dark intervals—thus, there are first, two orange rays close together, then a bright green line, then two bluish-green lines near to each other, then a very bright purple line, and lastly a violet line. The sparks taken in the same manner from zinc, cadmium, tin, bismuth, and lead in the melted state, were found to give similar appearances; although the number, position, and colours of the lines were in each case different. The appearances, he says, are so characteristic, that *by this mode of examination the metals may be readily distinguished from each other*. He ascertained, moreover, that the results were not due to the combustion of the metals, for the same appearances were observed when the sparks were taken in the vacuum of an air-pump, and in carbonic acid gas. In this way, therefore, another advance was made in the progress of spectrum analysis ; and from that time to the present it has been carried still farther by the experimental researches of Foucault in 1849, Masson in 1851-55, Angstrom in 1853, Alter in 1854-55, Secchi in 1855, Plücker in 1858-59, and Willigen in 1859 —all of whom studied and described the appearances of the spectra obtained by the prismatic decomposition of the electric spark when taken from different metals and in different gases and vapours— their results being almost demonstrative of the fact, that the characteristic differences of the spectra are due to differences in the quality of the light emitted from the different vapours and gases when heated to incandescence by the high temperature of the spark. But this conclusion was not reached at that time, although it was often nearly approached. If indeed, this true explanation of the phenomena had been fully recognised, and the general fact, as above described, had been perceived in all its importance, it would no doubt have been the means of anticipating the brilliant speculations which have lately distinguished the names of Bunsen and Kirchhoff.[*]

And while these researches were in progress, another and very different set of observations were fast leading to the same conclusion. Long ago it was known that when certain saline substances are put into a flame it acquires a characteristic tint—the salts of soda, for example, give it a deep yellow colour, potash a violet, baryta and boracic

* I am indebted to the lecture of Dr. W. A. Miller, in the *Pharmaceutical Journal* for February, 1862, for this *résumé* of historical facts.

acid a green, copper a greenish blue, strontia and lithia a red, and so on. This indeed was the secret of pyrotechnic chemistry, and the delicacy and speciality of the reactions were such that they were often made available in qualitative mineral analysis; but no one thought of examining these coloured flames with a glass prism until the year 1822, when their spectra were first described by Sir David Brewster. Sir John Herschell also, in the same year, gave an account of the spectra of flames tinted by muriate of strontia, muriate of lime, chloride and nitrate of copper, and boracic acid ; and a little later he added those of lithia, baryta, and iron—saying that the muriates succeeded best, because of their volatility ; and that the colour could be easily exhibited by putting the salts in question upon the wick of a spirit-lamp. He also stated that *the colours thus communicated by the different bases to flame, afford, in many cases, a ready and neat way of detecting extremely minute quantities of them* ; and he concluded, from experiments made in various ways, that *the tint arose from the molecules of the saline matter reduced to vapour, and held in a state of violent ignition.*

A year or two later, the subject was still farther pursued by Mr. Fox Talbot, who, in 1826, when describing the results of his experiments, said, that *" a glance at the prismatic spectrum of a flame may show it to contain substances which it would otherwise require a laborious chemical analysis to effect."* He proved also, that notwithstanding the great similarity in the red tint given to flame by strontia and lithia, yet the prismatic spectra exposed at once the differences of the two ; for the strontia flame produces a great number of red rays well separated from each other by dark intervals, not to mention an orange, and a very definite bright blue, ray, while lithia exhibited only one single red ray. *" Hence "* to use his words, *I hesitate not to say that optical analysis can distinguish the minutest portions of these two substances from each other with as much certainty, if not more, than any other known method.*[*]

In the year 1845, the spectra of coloured flames were described by Dr. W. A. Miller, in a paper read before the chemical section of the British Association at Cambridge. He used an alcohol-lamp fed with spirit, in which the chloride of the metal was dissolved, and the paper was illustrated with coloured lithographs of the various spec-,

* *Philosophical Magazine* for 1834, Vol. iv. p. 114.

tra—including those 'from copper, boracic acid, nitrate of strontia, chloride of calcium, and chloride of barium. He also described the spectra of the chlorides of sodium, manganese, mercury, and a large number of other metals ; and the paper concludes with this observation : "It may be interesting to remark, in connection with the speculations on the absorptive actions of the sun's atmosphere, that if the solar light be transmitted through a flame exhibiting well-marked black lines, these lines reappear in the compound spectrum, provided the light of day be not too intense compared with that of the coloured flame. This may be seen in the red light of nitrate of strontia, and less perfectly in the green of chloride of copper. *It would, therefore, appear that luminous atmospheres exist in which not only certain rays are wanting, but which exercise a positive absorptive influence on other light.*" * This, as we shall hereafter perceive, is the real basis of the great generalizations of Kirchhoff, as regards the phenomena observed in the spectra of the sun and other planetary bodies.

As far, however, as prismatic analysis is concerned, it is evident, that although the experiments of chemists and opticians had demonstrated. the extreme delicacy of this method of inquiry, in betraying the presence of the minutest quantity of metallic matter in the flame of alcohol, or in the electric spark, yet it did not acquire a practical tendency, or become a systematic means of research, until the year 1859, when Kirchhoff and Bunsen contrived their apparatus for spectrum analysis. It consists of a prism (P.), Fig. 1., supported upon a steady tripod (F.), and kept in its place by a spring (c.). The tube (A.) is furnished at its distal end with a slit, which can be opened or closed by the screw e., so as to regulate its width. Half of the slit is covered by a reflecting prism, which allows the light from the lamp or burner (D.) to be reflected down the tube upon the prism (P.), while the light from the lamp or burner (E.), passes through the other half of the slit, and goes directly down the tube to the prism (P.). In this way the observer, looking through the telescope (B.), can see the spectra of the two flames (D. and E.) side by side, and can thus compare them. a. and b. are screws for adjusting the telescope, so as to bring any part of the slit at e. into the centre of the field of vision ; and c. is a tube having a lens at the end nearest the prism, whereby the light passing through a micrometer

* *Pharmaceutical Journal.* Vol. viii. p. 405.

scale, at the other end of the tube, is focussed upon the face of the prism, and so reflected to the telescope : by this means the position of any lines of the spectrum may be ascertained and described.   The telescope (B.) as well as the tube (C.), is moveable in a horizontal plane around the axis of the tripod; and all stray light is shut off when the instrument is in use, by covering it with a black cloth.

Fig. 1:
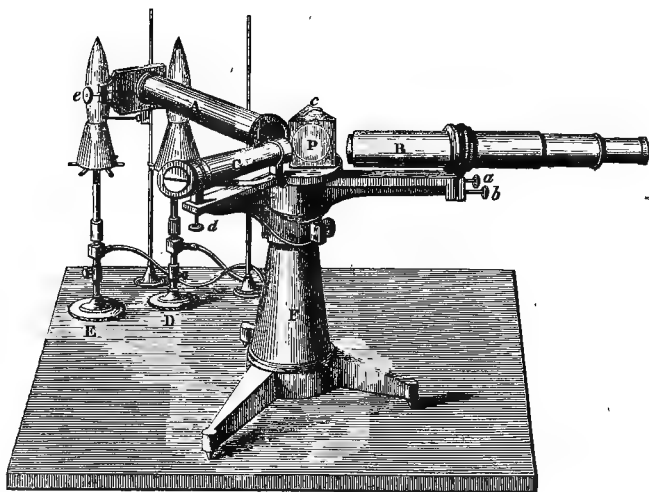
A more simple form of the apparatus called a student's spectroscope, has been contrived by Mr. Browning, (Fig. 2).   It consists of a prism of very dense glass, with a tube having a slit that can be graduated to any width.   The slit is furnished with a reflecting prism, so that, as in the former case, two spectra can be seen and compared at the same time.   The telescope moves upon a graduated circle, which reads with a vernier, and thus there is no necessity for the illuminated scale of Kirchhoff and Bunsen's instrument, while it enables the observer to ascertain the position of a line in angular measure instead of by an arbitrary scale.

The method of conducting the inquiry is, in all cases, the same ; a small portion of any volatile salt of a metal, the chloride being best, is placed upon a little ring of platinum wire and introduced into a colour-

less flame, as the flame of a Bunsen burner,* or of a spirit-lamp, or, better still, of hydrogen. The flame (E.), Fig. 1., thus charged and tinted with the metallic chloride, is placed in front of the slit, and the telescope is moved in its horizontal plane until the spectrum of the flame is seen. For the sake of comparison, another flame, as at D., is so placed that the prism which covers half of the slit, reflects it up the tube (A.), and through the prism (F.) into the telescope (B.). By which means the two spectra are seen side by side. The flame at D.

FIG. 2.
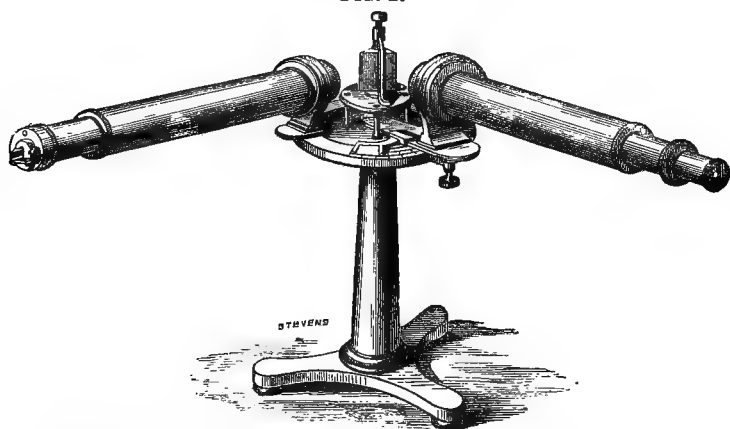
may be either that of a lamp, or of another Bunsen's burner with the salt of a known metal in it.

Proceeding in this manner Bunsen, Kirchhoff, and others have examined the volatile salts of all the metals, and have constructed charts of their various spectra. Those of the alkalies and alkaline earths are the simplest and the most characteristic; and the delicacy of their reactions, when properly observed, is remarkable. In illustration of this, I may mention that while Bunsen was in this way examining the residue of a mineral spring at Durkheim, he observed the appearance of certain blue and red bands in the spectrum, which were not common to any known substance, and by pursuing the

---

* A Bunsen burner is a small tube of brass, about four inches long, and half-an-inch in diameter, placed upon a burner with a minute perforation or slit, and the tube has a number of holes at the bottom of it for the entrance of air. As the gas escapes from the burner and rises in the tube it draws in the air, and so produces a flame without any light.

inquiry, he discovered two new metals of the alkaline series, which he named *Cæsium* and *Rubidium*. The former was so named, because of its producing two characteristic blue lines of a sky colour (*Cæsius*), and the latter from *Rubidus*, dark red, in consequence of its showing two red lines at the very edge of the red end of the spectrum. The quantity of these metals in the Durkheim water was not more than about three grains per ton of water. In like manner *Thallium* was discovered by Mr. Crookes, in March, 1861, in the seleniferous deposit from the sulphuric acid manufactory at Tilkerode, in the Hartz Mountains; and it was so named from *Thallus*, a budding twig, on account of the beautiful green line which distinguishes its spectrum. *Indium* also, a fourth new metal, was discovered in 1863 by MM. Reich and Richter of Freiberg, in a Saxony zinc-blende, and was thus named because of the two splendid indigo-blue lines which characterize its spectrum. The first of these metals, Thallium, is of the nature of lead, and gives a bright green tint to a colourless flame; while the second, Indium, is closely related to zinc, and gives a rich violet-blue colour to flame.

Of all the spectra, however, those of the alkalies and alkaline earths are the most characteristic; and they are also the most easily obtained. In each case the spectrum is known by certain lines or bands of colour; and as these are of different degrees of importance, they are distinguished by the letters of the Greek alphabet—beginning with the most important.

In Fig. 3. the spectra of these metals are shown as they appear when the metals are heated upon a loop of platinum wire in the flame of a Bunsen's burner; and in order that the position of the various bands of colour may be seen, the chief lines of the solar spectrum (Fraunhofer's lines) are drawn and distinguished by capital letters—the first spectrum of the series being the solar spectrum.

Potassium (*Ka.*) furnishes the longest and least remarkable spectrum of all the alkalies. It is nearly continuous in the middle, but it has two characteristic bands of colour, one red, α, which corresponds with Fraunhofer's solar line, *A.*, and the other violet, β, at the opposite end of the spectrum, near to the line, *H.* When the heat of the flame is very intense, another broad band of a pale orange-red colour appears in the solar line *B.* of Fraunhofer.

Sodium (*Na.*) produces a very simple spectrum, for it gives but

one solitary band, of a bright yellow colour. This corresponds exactly with the line *D*. of Fraunhofer.

Lithium (*Li.*) is characterized by an intense crimson band, in the middle of the space between the solar lines, *B.* and *C.*, and by a faint orange-yellow band, β.

FIG. 3.
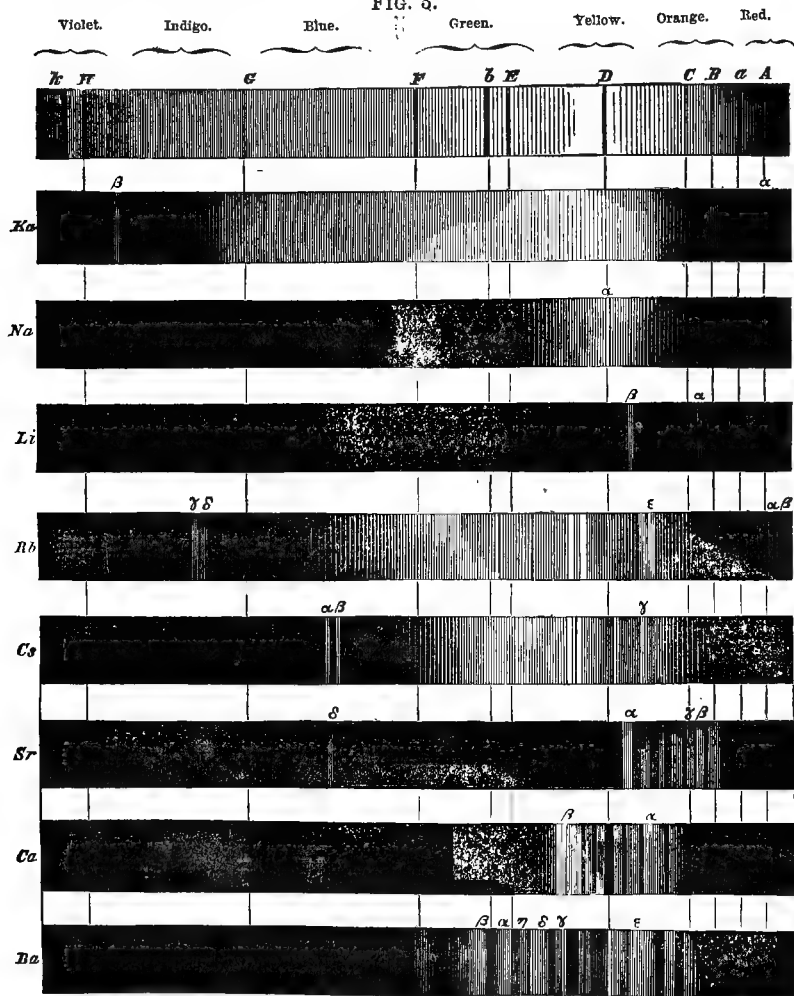
Rubidium (*Rb.*) is known by its two bright red lines, *a* β., at the

red end of the spectrum, and by two violet-coloured lines, $\gamma\delta$., in the space between G. and H. There are also two orange lines at ε, when the temperature of the flame is high.

Cæsium (*Cs.*) is like potassium in giving a good deal of diffused light in the middle of the spectrum, but it exhibits two bright blue bands, $a\beta$, in the space between the solar lines F. and G.; and if the flame is very hot, there are also two or three orange-coloured bands, γ, near to the solar line D.

Strontium (*Sr.*) produces a broad orange-coloured band, a, close to Fraunhofer's line, D., and five or six red bands, between B. and D., two of which, β and γ, are always well marked. There is also a faint blue line, δ, about midway between F. and G.

Calcium (*Ca.*) shows a bright and rather broad orange-coloured band, a, in the middle of the space between the solar lines, C, D.; and there is also a faint reddish band on the red side of it, and three or four pale yellowish-green bands on the yellow side of it; besides which there is a rather broad and bright green band, β, in the space between D. and E.; and when the temperature of the flame is high, there is also a blue line on the indigo side of G.

Barium (*Ba.*) presents the most complicated appearance of all the alkaline spectra, for it exhibits five or six green bands of different widths in the green part of the spectrum. These lines are marked $a\beta\gamma\delta\eta$ in the diagram, and the letters represent the order of brilliancy. In addition to these lines there is an orange band, ε, and three or four yellow bands near to Fraunhofer's solar line, D., and a few very faint red bands at C.

The delicacy of this method of research is most remarkable. Swan found by actual experiment that he could discover the presence of the $\frac{1}{2,500,000}$th of a grain of sodium by its characteristic yellow line; in fact, the reaction of this metal is so delicate, and the presence of common salt in air and water is so universal, that it is very difficult to get a flame free from the sodium line. Bunsen and Kirchhoff have rudely estimated the delicacy of the spectrum test by deflagrating known quantities of different substances in a room, and then noting the prismatic effects. In this way they have calculated from the area of the room, and the quantity of matter diffused through it, that it is possible to recognise the $\frac{1}{180,000,000}$th of a grain of soda, the $\frac{1}{60,000,000}$th of a grain of lithia, the $\frac{1}{1,000,000}$th of a grain of lime or

strontia, and the $\frac{1}{60,000}$th of a grain of potassa or baryta. Cæsia may be discovered when the quantity of chloride used does not exceed the $\frac{1}{170,000}$th of a grain, but it requires about $\frac{1}{33,000}$th of a grain of rubidia to produce its characteristic spectrum. The speciality of these reactions is still observed when the salts of the several metals are mixed together; for as the compounds are volatalized at different temperatures, the several spectra follow each other in the order of volatality : in fact, if the chlorides of potassium, sodium, lithium, calcium, strontium, and barium, are mixed together in no larger quantity than the $\frac{1}{600}$th of a grain of each, and the mixture is put upon a platinum wire, and held in the flame of a Bunsen's burner, the spectrum of each salt is clearly discoverable—first, there appears the bright yellow line of sodium ($Na.\ a$, Fig. 3), with a pale and nearly continuous spectrum of potassium in the background. As the sodium line fades away, the bright red line of lithium ($Li.\ a.$) comes into view, and beyond it is the faint red potassium line ($Ka.\ a.$); then there appear the two green barium lines ($Ba.\ a,\ \beta.$) with their peculiar shadings; and as all these fade away, the orange, and the green lines of calcium, ($Ca.\ a,\ \beta.$), and the red lines of strontium ($Sr.\ a,\ \beta,\ \gamma,\ \delta.$), gradually come into view, and then pass away like the figures of a dissolving view.

Other examples of the delicacy of the test may be given, to show how certainly and easily the minutest portion of these alkaline metals may be discovered. If a little of the ash of a cigar is put upon a platinum wire, moistened with muriatic acid, and then heated in the flame, it shows the characteristic lines of sodium, potassium, lithium, and calcium; and the residue of a single drop of sea-water, treated in the same manner, exhibits the spectra of sodium and calcium. A drop also of the mother-liquor of almost any mineral spring, will show the coloured lines of nearly all the alkalies and alkaline earths.

It is, therefore, easy to understand, how, by this method of research, traces of substances have been found, where they were not suspected to exist, and where, but for this process, they might have remained for ever undiscovered. The alkali lithia, for example, once thought to be so rare, is now known to be widely distributed. It has been recognised in a large number of mineral waters, in the ashes of tobacco, in vine leaves, grapes, the tartar of wine, the potashes of commerce, and indeed, in the ashes of all plants which grow upon certain granitic soils. It has also been found in the milk of animals

feeding upon those pastures, in human blood, and in muscular tissue. Strontia also, instead of being a comparatively scarce substance, exists nearly everywhere in the mineral kingdom : it is present in sea-water, in the incrustations upon the boilers of sea-going vessels, in chalk, in certain marbles, and in a great variety of limestones.   The new metal, thallium, has likewise been found in many pyritic minerals, associated with copper and iron ; and it has been recognised in the ashes of the grape, tobacco, and chicory ; and in treacle and wine. The extent to which these researches may be applied in gaining information of the mineral constituents of animal and vegetable tissues is almost unlimited ; and the influence of them on the future of physiology is hardly to be conceived.

In all cases, the proper means for developing the spectra of the metals is to convert them into volatile salts ; and of all salts, the chlorides are best suited for the re-action ; recourse must, therefore, be had to certain contrivances for effecting this.   In most instances, it is sufficient merely to moisten the substance with muriatic acid, and then to put it upon platinum wire, and hold it in the flame of a Bunsen's burner, or, better still, in that of hydrogen ; and when the spectrum disappears, to moisten it again and again with the acid, before heating it.   Professor Kirchhoff and Bunsen have given full directions for the treatment of mineral substances, when they are not acted on by muriatic acid * ; and Mr. Reynolds has contrived a very simple plan whereby nearly all minerals are made to show the spectra of their constituents.   He uses the double blow-pipe jet of Mr. Herapath ; and by supplying it with hydrogen, and blowing steam charged with muriatic acid through the inner jet, he is able to get a flame which decomposes the fragment of any mineral held in it ; and the chlorides so formed, produce the spectra of the constituents.   In this way, he has discovered thallium in many Irish pyrites.

Another and better means of observing the spectra of the less volatile metals, is by examining the electric spark as it passes between fine wires of the metals.   The spark is best obtained by using the induction coil of M. Ruhmkorff,—the light being strengthened by having the wires in communication with the coatings of a Leyden-jar.   By this means the characteristic tint of the metal is seen in the spark, in

* On Chemical Analysis by Spectrum Observations, *Journal of the Chemical Society*, Vol. xiii., p. 270.

consequence of a very minute quantity of it being volatalized by the heat and the disruptive power of the electrical discharge; and when examined by the prism, the spark gives the spectra of the several metals in even greater splendour than the flame.

The spectra of the non-metallic bodies are best seen by passing the spark from Ruhmkorff's coil through a narrow tube containing a mere trace of them, either alone or in combination, and, in a rarefied condition. The spark is very brilliant, and from the high temperature,—it gives a magnificent spectrum. In fact, it should be noted that the spectra of all substances vary with the temperature, becoming more and more brilliant, and even more and more complex, as the temperature rises. The lowest heat is that of Bunsen's burner; then follow the spirit-lamp, the hydrogen flame, the oxyhydrogen flame, the voltaic arc, and the electric discharge. Bunsen and Kirchhoff are of opinion that the spectra are the same in all cases, but that with a higher temperature, and therefore a stronger light, the duller parts are made more evident, and thus the spectrum is more fully developed. Plücker and Hittorf, however, have shown that the spectra of many of the elements are altogether different at different temperatures, and that the passage from one spectrum to another, is not gradual as the temperature rises, but sudden, showing that there is a corresponding molecular change, and that the body suddenly assumes a new allotropic condition. Nitrogen exhibits three of these changes at different temperatures; and sulphur is affected in the same way, although not to the same extent. Chloride of lithium also, at the comparatively low temperature of a Bunsen's burner, shows only the crimson line ($Li. a$, Fig. 3), but with the hydrogen flame, it exhibits the orange line ($Li. \beta$), and with the great heat of the oxyhydrogen jet, or the voltaic arc it produces a blue line. The same is true of iron, and many other metals, their spectra being much more complicated at high temperatures than at low.

The rationale of the action is the same in all cases; the spectra being due to the peculiar light emitted by the element in its ignited *gaseous* or *vapourous condition;* for if a *solid* or *liquid* substance is heated, so as to be luminous, it invariably produces a *continuous spectrum* with all the tints of the rainbow. It may be that the yellow or red rays predominate on account of the body being yellow or red-hot, and not white-hot; but for all this the spectrum is invariably con-

tinuous.   Not so, however, with a gaseous flame, or with an electric
spark; for then the temperature is so high as to decompose com-
pounds, and set free the elements—keeping them for awhile in a
gaseous condition intensely heated; and it is this incandescent gaseous
or vapourous matter which produces the characteristic non-con-
tinuous spectrum.   Hence the necessity for using those salts of the
metals which are most volatile, and which are most easily decom-
posed by flame.

Remarkable, however, as these discoveries of Bunsen and Kirch-
hoff are, with respect to the prismatic properties of incandescent
elementary gaseous matter, it is very probable that they would not
have commanded much attention if the same observers had not also
discovered, or rather proved, that all elementary gaseous matter is
endowed with the power of absorbing and destroying the very same
beams of light which it emits.   Long ago, this fact was suspected,
although its importance was not perceived.   In 1845, Dr. W. A.
Miller observed that when solar light was transmitted through a
coloured flame, and examined with a prism, the dark absorptive
bands appeared in the compound spectrum, provided the solar light
was not too strong for them; and he concluded that such flames or
luminous atmospheres had a positive absorptive influence on certain
colours of other lights.   Later still, in 1849, when M. Foucault was
examining solar light by passing it through the voltaic arc, and so
producing by means of a prism, spectra of the two lights, he noticed
not only that the dark solar line (D) corresponded exactly with the
bright yellow sodium line of the arc, but also that the yellow line
darkened still more the solar line; for when the two spectra were
made to overlap each other exactly, the dark solar line was consider-
ably strengthened; but when, on the contrary, they only partially
overlapped each other exactly, the line (D) was darker than usual in
the solar spectrum, while it stood out brightly in the electric.   He
even did more than this, to show that the luminous matter, emitting
the yellow line, had the power of absorbing yellow light; for he
projected upon the arc, the reflected image of one of the incandes-
cent points of carbon, which, like all ignited solids, gives a continuous
spectrum with no lines; and then he found that the black line (D)
appeared as in the solar light,—showing that the incandescent matter
of the voltaic arc, which was emitting yellow light, absorbed the

corresponding light from the incandescent point of charcoal, and so produced a black line. This, as Dr. Miller observes, was the germ of Kirchhoff's important generalization, although its ingenious author was far from perceiving its full importance. In 1855, Angstrom carried the inquiry still further, and after speaking of the close correspondence of some of the dark lines in the solar spectrum, with the bright lines of certain electrical spectra, he says, " they produce the impression that one spectrum is a reversion of the other," and he adds that he is therefore convinced that the explanation of the dark lines in the solar spectrum embraces that of the luminous lines in the electric spectrum. It was Kirchhoff who furnished that explanation, by showing that the rays, which a body emits, are the very rays which it absorbs. The real value of this fact can hardly be over-estimated; and it is surprising that Foucault, Miller, and Angstrom, who were so near to its discovery, did not perceive it; and that it was left for Kirchhoff in 1859, to prove it, by experiment, by shewing that when any saline substance is rendered luminous, it emits rays of certain and definite refrangibility, and that the same substance has also the power of absorbing rays of identically the same refrangibility. Sodium, for example, when ignited, emits an intensely brilliant yellow light, which shows itself in the spectrum as too closely contiguous bands of yellow, close to Fraunhofer's line (*D*); but if through the flame of sodium, the more powerful beams of the electric, or the oxyhydrogen light are transmitted, the continuous spectrum of the stronger light is interrupted by the black lines coincident with the sodium lines, or the dark band (*D*) of the solar spectrum. Kirchhoff also ascertained that certain of the bright bands in the spectra of potassium, lithium, barium, and strontium, may, in like manner, be reversed; and Dr. Miller found that some of the strongest of the blue lines in the copper spectrum might also be reversed in the same way.

The explanation of this is very simple, and it applies to the corresponding phenomena of radiant heat, as well as to those of actinic or chemical action. " Atoms," says Professor Tyndall, " which swing at a certain rate, intercept waves which swing at the same rate. The atoms which vibrate red light, will stop red light; the atoms that vibrate yellow, will stop yellow; those that vibrate green, will stop green, and so on. Absorption is a transference of

motion from the æther to the molecules immersed in it, and the absorption of any atom is exerted chiefly upon those which arrive in periods coinciding with its own rate of oscillation."* This is true of every variety of vibration, and in the case before us the vapour of a metal put in the tract of a beam of light, will stop its own peculiar vibrations, and therefore, will produce dark bands in those very places in the spectrum, where its own characteristic coloured bands would have appeared. Or if the bands are obtained from the incandescent vapour, of a metal, and the light thereof is made to pass through a similar vapour, the course of the light is stopped, and there are no bands at all. The reason, therefore, why incandescent solids and liquids exhibit a white light, and produce a continuous spectrum, consisting of all the prismatic colours, is that their atoms or molecules swing in every variety of vibration from the red to the violet; whereas the vapour of an element swings only in certain vibrations, and thus produces a coloured flame which gives only the few bands of the spectrum which are characteristic of that flame.

The application of these facts to the interpretation of the luminous phenomena of the universe, and more especially to the analysis of cœlestial objects, is most interesting; for as the results are not influenced by distance, it follows that whenever there is light enough from any planetary body to produce a spectrum, it affords the means of ascertaining its nature, and of determining its condition. If, for example, it is found that the light emitted by any star or far-off luminous object gives a spectrum with the characteristic bands of ignited terrestrial matter, it is proof that such matter exists therein; and if the spectrum is continuous, it is manifest that the light comes from an incandescent solid or liquid; whereas if the spectrum is not continuous, but consists of only a few bands of colour, it shows that the light is emitted by matter in a state of gas or vapour. And if, in addition to the continuous spectrum, there are dark lines in it, it proves that there is a central mass of ignited solid or liquid matter, with an atmosphere or envelope of vapour through which the light passes, and by which certain rays are absorbed on darkened. This is the interpretation of the dark lines of Fraunhofer in the solar spectrum, which have been for so long a time the puzzle to philosophers. According to the hypothesis of Kirchhoff, the sun consists

* *Heat considered as a Mode of Motion*, p. 468.

of a central orb of molten or solid matter intensely heated, and as
this emits rays of all kinds of refrangibility, it would give a con-
tinuous spectrum, without a break or bar in it, were it not that it is
surrounded by a vapourous envelope through which the rays must
pass; and in so doing they are partly absorbed ; for each element of the
gaseous envelope strikes down the very rays which it does itself
emit, and thus produces its own black lines.   If we could see the
spectrum of the envelope alone, without the luminous orb behind
it, we should see the very bands, which are now dark, lighted up
with their characteristic tints.   It would be, in fact, the complex
spectrum of all the elementary gases and vapours existing in it.
Examined, therefore, from this point of view, we have in the black
lines, the dark or reversed spectrum of every element in the solar
atmosphere ; and we have but to compare them with the spectra of
terrestrial vapourous matter to determine their nature.   In this way
the labours of Kirchhoff and Bunsen have been directed to the spectral
analysis of the sun.   The position of every line has been compared
with the spectral lines of terrestrial matter ; and although much has
been done in determining the chief constituents of the solar atmosphere,
yet as each line must be accurately compared in every particular, it will
take many years before the whole of them can be properly studied.
Already about 2000 of them have been thus mapped out ; and they
indicate the presence in the sun's atmosphere of sodium, calcium,
barium, and magnesium; with iron, nickel, cobalt, chromium, copper,
and zinc.   There may also be potassium and strontium ; but there
are no traces of lithium, cæsium, rubidium, aluminium, arsenicum,
mercury, silver, gold, cadmium, tin, lead, silicium, or antimony.
The coincidences of a few of these lines are seen in Fig. 4, which
represents only a very small piece of the solar spectrum from E to b
in the green of Fig. 3.

The recognition of these lines requires a special apparatus, with a
series of prisms of great dispersive power, whereby the spectrum is
much elongated, and the lines and colours spread out so as to be widely
separated from each other.   Instruments have been constructed with
as many as eleven prisms in series ; and for the purpose of obtaining
the highest degree of dispersive power, the prisms have been made
hollow, and filled with bisulphide of carbon, which is a liquid of
great refractive power.   In this way the sodium line (D) which
looks single in the common spectroscope, and only double in the

better kinds of instruments, is found
to be made up of eight lines, and
thus also the positions of other lines,
have been accurately determined.

It would be out of place to follow
the subject much further in this
direction, although it is evident that
if the interpretation of the pheno-
mena of the spectra of planetary
bodies is correct, it affords a means
of unravelling the structure of the
whole visible universe; and there
are not wanting observers who are
pursuing the inquiry with uncom-
mon diligence—Cooke in America,
Donati in Italy, Miller and Hug-
gins in this country, and Bunsen
and Kirchhoff in Germany, have
already done much for the founda-
tions of cœlestial chemistry, and
their results are most interesting.
Looking at the spectral phenomena
of the nearer planetary bodies,—the
members of the solar system,—they
are able to say, not only that the
light received from them is the
same as that emitted by the sun,
and is, therefore, entirely reflected
light, but also that some of them
have atmospheres, while others have
not. The light of the moon, for
example, gives a spectrum so exactly
like the solar spectrum, and so
entirely free from aërial lines, that it
affords conclusive proof of its not
having an atmosphere. Not so,
however, with Venus, Mars, Jupiter,
and Saturn, for they all show certain
additional dark lines, which are in all

Fig. 4.
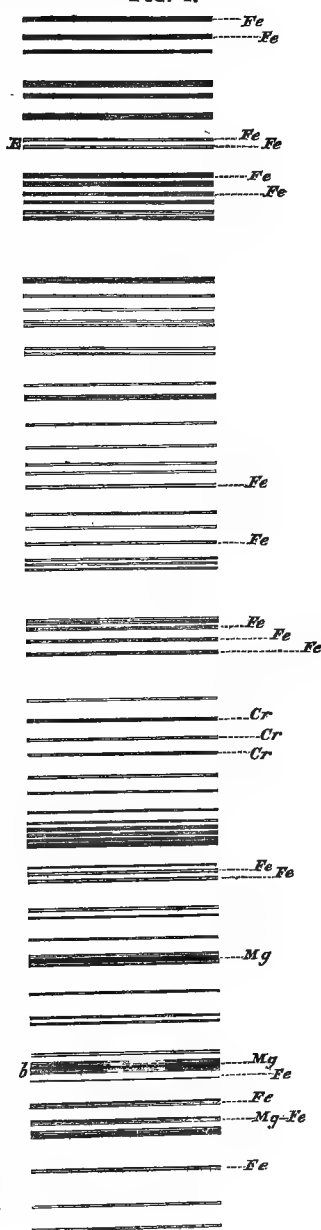
probability due to the absorptive power of an atmosphere. In fact these lines correspond so nearly with the lines which are seen in the solar spectrum when the sun is just sinking below the horizon, and when its light is passing through a great length of atmospheric air, that we may fairly assume they are due to the same cause.

But, besides the near planetary bodies, about fifty of the very distant fixed stars have been examined; and, as they all give continuous spectra, with the same sort of dark lines, though not quite in the same position, as those of the solar spectrum, it is reasonable to conclude that they are all centres of light—self-luminous, and having precisely the same structure as our own sun. Two of these, namely, *Aldebaran* and *Betelgeux Orionis* have been most carefully studied by Dr. Miller and Mr. Huggins; and they have ascertained that the former shows a great number of dark lines in every part of the spectrum except the red, while the latter exhibits a preponderance of lines in the red, green, and blue. This, as Dr. Miller and Mr. Huggins suggest, is no doubt the cause of the peculiar colours of these stars, for the one looks red and the other orange—these being the rays which are least obscured in the two cases. It is, indeed, very probable, that the different tints of the fixed stars, are always due to the same cause, namely, the existence of a larger number of black bands in one part of the spectrum than in another —certain rays being thus obscured, while others pass freely. The position of these dark lines, however, is not the same as in the solar spectrum, and, therefore, it is evident that the vapourous matter which produces them is not the same; although certain metallic elements are nearly always present in the fixed stars, as sodium, magnesium, calcium, iron, bismuth, and tellurium. These, indeed, are the leading constituents of the stellar universe. Hydrogen, also, is very generally distributed, though it is absent in *a Orionis* and *β Pegasi.*

As a very striking example of the remarkable information afforded by this method of inquiry, the following may be cited :—

On the 16th of May last a new star was discovered in the constellation of the Northern Crown (*Corona Borealis*); when Dr. Miller and Mr. Huggins examined it with the prism, they observed that it gave three spectra superposed upon each other—one of these was a continuous spectrum analogous to that of the sun, the other was a spectrum of dark lines, and over this was a third spectrum of a few very bright lines. It was evident, therefore, that the star was not only com-

posed like the sun and other fixed stars, of a central orb of incandescent matter, with its outer atmosphere of cooler vapours, but it also possessed another and a still more luminous atmosphere, which had all the characters of ignited hydrogen. This, together with the sudden outburst of brilliancy in the star, and its subsequent rapid decline in brightness, suggested the rather bold speculation, " that in consequence of some vast convulsion taking place in the star, large quantities of gas have been evolved from it ; and that the hydrogen present is burning by combination with some other element, and furnishes the light represented by the bright lines; also, that the flaming gas has heated to vivid incandescence the solid matter of the photosphere. As the hydrogen becomes exhausted, all the phenomena diminish in intensity, and the star rapidly wanes."*

Encouraged by the success which has followed the examination of the fixed stars, Mr. Huggins has extended the inquiry to those mysterious bodies, the unresolved *nebulæ*, which some astronomers think are clusters of minute stars—so distant that the present powers of the telescope fail to magnify them into distinct points, while others consider them to be masses of glowing vapours. Now, in all those cases, where the telescope had resolved the nebulæ into groups of stars, the prism showed a continuous spectrum—and thus, therefore, the two sets of observations are coincident; but in eight cases where no magnifying power was able to discover distinct points, the spectra were not continuous, but merely two or three lines like an ignited gas. From which it may be concluded, that although these nebulæ are comparatively bright objects, they will never be resolved into groups of stars, for they are only masses of luminous gas. In all cases the spectra are very nearly alike, consisting of three bright bands, one of which corresponds to hydrogen, another to nitrogen, and the third to an unknown substance. It is not probable, therefore, that these nebulæ will ever be condensed into solid or liquid orbs.

An examination of the spectrum of the comet of 1866 (Tempel's), showed a broad but faint series of colours; and the minute nucleus, which was apparently self-luminous, consisted of nitrogen, but the chief light from the comet, giving a faint continuous spectrum, was evidently reflected, probably from the sun. Astronomers will wait with some impatience for an opportunity of examining the spectra of other comets, and of so determining their nature.

All these illustrations are but proof of the extreme sensibility, as well as extensive applicability of spectrum analysis; for they show that the visible chromatic spectrum of any luminous object, whether it be an ignited solid or liquid, an incandescent gas or vapour, an electric discharge, or a distant planetary body, affords evidence not merely of the chemical composition of the body, but of its physical structure.

And if the inquiry is carried still further, it is found that every visible spectrum is associated with two other spectra which are not visible, but whose manifestations, when properly interrogated, are equally characteristic, and may yet become equally important aids to analysis. One of these is situated at the red end of the luminous spectrum, and consists of rays of heat which are less refrangible than those of light. The other is found at the opposite, or violet end of the coloured spectrum, and is produced by the highly refrangible actinic or chemical rays.

Long ago, the experimental researches of Melloni exposed the peculiar properties of the first of these rays, by showing that in many respects they are similar in their modes of action to the rays of light; for they are refracted, dispersed, absorbed, and transmitted by different substances. Unlike the rays of light, however, they do not always pass with the same facility, through the same media; for substances which freely transmit the one, will often arrest the other— alum, water, glass, &c., which are so perfectly transparent to light, are more or less opaque to heat; while a solution of iodine in bisulphide of carbon, which is quite dark to light, is yet freely transparent to heat; a few other substances as rock-salt, and bisulphide of carbon, are transparent to both.

At present we know but little of the spectra from these rays, although recently the investigations of Professor Tyndall have added something to our knowledge of them ; for he has not only proved the existence of a thermotic spectrum, composed like the luminous spectrum of rays of different degrees of refrangibility, but he has also demonstrated a difference in the thermotic spectra when the rays of heat are passed through different substances, and has proved that, as with light, each substance will arrest or absorb its own peculiar rays. The application, however, of these facts to analysis, is not yet so easy as in the case of light, chiefly because we have no instrument for discovering the differences in the quality of the thermotic rays ;

and yet it would seem that the delicacy of their manifestations is singularly great; for the merest trace of certain volatile substances, as the hydrocarbons, ammonia, boracic æther, and the perfumes of flowers, when present in the air, is sufficient to arrest the passage of radiant heat, and so to discover their presence.   No process of chemical analysis is at all equal to it in the delicacy of its manifestations; for, to use the words of Professor Tyndall, "it would be idle to speculate on the quantities of matter implicated in the results.*   Nor is this all; for the absorptive power of different substances gives us an insight into their molecular constitution.   As a rule, the elementary gases and vapours permit a free passage to radiant heat, whereas compounds, which are always groups of atoms, arrest it.   "For every ray struck down by air, oxygen, hydrogen, or nitrogen,—ammonia strikes down a brigade of 7,260 rays; olefiant gas a brigade of 7,950; while sulphurous acid· destroys 8,800;" † and boracic æther 180,000.   Even when the molecules of a scent are diffused through atmospheric air, so as to be hardly perceptible, and when the atoms of the latter are almost infinite in number as compared with the molecules of the former, yet the particles of scent absorb the rays of heat in a notable manner; for in such an atmosphere, thinly scattered as they are, the molecules of the volatile oil of patchouli will do thirty times the execution of all the air; otto of roses does thirty-six times the execution of the air; thyme seventy-four times; spikenard three hundred and fifty-five; and aniseed three hundred and seventy-two times.   The conclusion from this, is that the complex molecules, or groups of atoms of compound substances, swing more freely, and take on more easily the thermotic motion of the æther in which they are bathed; and that they thus absorb the rays of radiant heat.   Is the hope, therefore, unwarranted that the phenomena of radiant heat may visualize the atoms and molecules of matter to the eye of intellect; and may show their mechanism and physical structure,—to take an instance or two, there is the element oxygen and its allotropic modification *ozone*.   In their ultimate chemical nature these bodies are the same, and yet how different are their activities; but on what does this difference depend? Examined by means of radiant heat, the former is found to give free passage to it, whereas the latter arrests its motion; and so ener-

* *Heat a Mode of Motion.*   Second Edition, p. 367.
† *Ibid*, p. 354.

getically, that it stands beside the hydrocarbons as an absorber of heat. The conclusion, therefore, is, that its structure is the same; and that it consists of atoms of oxygen packed together into groups, or molecules, which swing freely in the circumambient æther. It may be that the same is true of other *allotropic* forms of elementary matter—as charcoal, plumbago, and the diamond; and the like conditions of phosphorus, sulphur, silicon, &c. How far these researches may extend to the comprehension of the molecular structure of organic groups, and even to that of organized matter is yet to be determined; but the prospect before us is certainly hopeful.

With regard to the other invisible spectrum, which is composed of actinic or chemical rays, and is found at the violet end of the luminous spectrum, there are many ways of exhibiting its presence. Professor Stokes has taught us how to make it visible by letting it fall upon a piece of paper moistened with a solution of sulphate of quinine, when it instantly appears as a dim blue phosphorescent light extending beyond the luminous spectrum. Other fluorescent substances, like sulphate of quinine, have the same power of changing the highly-refracted invisible chemical rays into visible rays of lower degrees of refrangibility of a blue colour; and by this means it is found that the actinic or chemical spectrum often extends to six or eight times the length of the coloured or visible spectrum. These rays, like the rays of light and heat, are intercepted by some substances, and transmitted by others. It is found, indeed, that glass, mica, bisulphide of carbon, and many other things which are transparent to light, are opaque to the chemical rays. This is so marked in the case of the alkaloids, and glucosides, or neutral active principles of vegetables, when they exist in solution, that it may be made the means of discovering their presence, even in very minute quantity. It often happens, in fact, as in the case of the luminous spectrum, that a band of absorption or maximum opacity appears; and the position of this band affords a highly distinctive character of the substance producing it.* On the other hand, rock-crystal (quartz), white fluor-spar, and water, are very permeable to the chemical rays.

Dr. W. A. Miller has obtained a photographic image of the chemical spectrum by receiving it upon a prepared film of collodion in a camera; and after exposure for five minutes to its action, he has developed the image in the usual way, and fixed it with cyanide

* *Proceedings of the Royal Society*, Vol. xii. p. 168.

of potassium.   It was, of course, necessary that the lenses, as well as the prism should be made of rock-crystal, as glass and other substance are more or less opaque to these rays.   In this manner he has obtained photographic self-made pictures of the actinic spectra of various substances; and the great facts deducible from them are,—first : that the light from different luminous objects produces very different spectra :—secondly, that there is no relation between the transparency of a substance and its diactinic power : and thirdly, that bodies which are either diactinic or opaque in the solid form, are the same in the liquid state, and in solution in water.

Sparks were taken from different metals by means of Ruhmkorff's induction coil, and the photographic pictures of the spectra showed a marked difference in the results.   Silver gives the longest spectrum ; and next in order are cadmium, zinc, nickel, cobalt, copper and tin; while the shortest are gold, chromium, manganese, magnesium, aluminium, lithium, potassium, and sodium.   " In many cases " says Dr. Miller, " metals which are allied in chemical properties, exhibit a certain similarity in their spectra.   This occurs, for example, with the magnetic metals—iron, cobalt, and nickel, and with the group embracing bismuth, antimony, and arsenic.   The more volatile metals exhibit generally the most strongly-marked lines.   Cadmium, for instance, gives two intense groups, zinc, two very strong lines near the less refrangible extremity, three near the middle, and four nearly equidistant lines towards the termination of the more refrangible portion, whilst in the spectrum of magnesium, the chemical action is almost suddenly terminated near the middle by a triple group of very broad and strong lines."*   When the spark of the different metals is taken, in air and other gases, it is found that there is the combined effect of the metallic and the aërial spectra.   An elevation of temperature also increases the length of the spectrum ; magnesium, for example, at the comparatively low temperature of the oxyhydrogen flame, ($15006°$ Fahr.) gives a short spectrum, whereas, at the high temperature of the electric spark, it produces a long one.   And as the chemical spectrum of the sun is rather short, it indicates that the temperature of its gaseous atmosphere is not above that of the oxyhydrogen flame.

Again, the permeability of different substances to the chemical

* *Proceedings of the Royal Society*, Vol. xii. p. 165.   See also *The Journal of the Chemical Society*, Vol. xvii. p. 59, for figures of the spectra.

rays is very different; for, of solid substances, rock-crystal, white topaz, white fluor-spar, ice, and pure rock-salt, are the most permeable. Of all liquids, water is the most diactinic; next to this is alcohol and the mineral acids; while the volatile oils, æther, and bisulphide of carbon are very opaque to the chemical rays. Dr. Miller has examined the diactinic power of many saline solutions, and the results indicate the possibility of using the chemical spectrum as an agent of analysis; for, "amongst the various compounds submitted to examination, the *fluorides* rank first in diactinic power; then follow the *chlorides* of the metals of the alkaline earths; the *bromides* of the same metals appear to be less diactinic than the fluorides and chlorides, and this decline in power in still more marked in the case of the *iodides. Sulphuric, carbonic, and boracic* acids furnish salts with the alkalies and alkaline earths, which are also largely diactinic; the *phosphates* seem to be less so, and the *arseniates* still less. It is remarkable, that although the sulphates are so diactinic, the *sulphites* are considerably less so, and the *hyposulphites* are more opaque than the sulphites.* But the group which is most remarkable for its absorptive power is the *nitrates,* all of which, as well as nitric acid, have a specific power in arresting the chemical rays, while the *chlorates,* which are otherwise so analogous, are strongly diactinic.

Gases and vapours also oppose the progress of the chemical rays although, contrary to what is observed with the thermotic rays, the elementary gases are among the most opaque of all substances; in fact, the diactinic power of oxygen, hydrogen, and nitrogen, is greater than that of any solid or liquid; while ammonia, olefiant gas, and some other gaseous hydrocarbons are far from being powerfully opaque.

All these results indicate a power of research, which is especially interesting to the physiologist, and which appear to be full of promise for the future. Already, indeed, the investigations of Professor Tyndall, with regard to the radiating and absorbing powers of certain gases, and vapours for heat, have been accepted by meteorologists as a means of explaining the peculiarities of climate, &c.; and the phenomena of actinic spectrum analysis, when applied to the examination of organic liquids, may yet be most fruitful of results. That, however, which is especially interesting to us is the application of chromatic spectrum analysis to the recognition of

---

* *Journal of the Chemical Society,* Vol. ii. New Series, p. 69.

organic and other colouring-matters, and to the discovery of their chemical and physiological nature. The blood, for example, when examined for its spectrum under the action of different reagents, shows that the colouring-matter is principally concerned in the phenomena of respiration; and the appearances of the spectra are so remarkable, that they become the means of discovering the presence of blood in very minute quantity. Professor Hoppe was the first to notice this;* and he became acquainted with it by passing a ray of light through a weak solution of blood, and examining it with a prism : he then observed that the blue end of the spectrum was cut off, and that two dark bands appeared in the green. The same effect was produced with the red blood of all animals, and he, therefore, proposed to use it as a means of medico-legal research. Later still, in 1864, Professor Stokes continued the inquiry;† and he ascertained that the colouring-matter of the blood, when fresh, was very different from the hæmatin of Lecanu; for it was soluble in water, and had the power of absorbing oxygen, and giving it out with great facility, and that the spectra in the two states of oxidation were very different. He, therefore, named the substance *cruorin*, distinguishing the bright red arterial or oxidized cruorin by the name of *scarlet cruorin*, and the purple or venous coloured deoxidized cruorin by the name of *purple* cruorin.

His method of research was very simple, for he merely placed a weak solution of blood behind a slit, and looked at it with a prism. It is, however, better examined by putting it into a test tube, and holding it before the slit of Browning's spectroscope (Fig. 3). When the blood is fresh, and the solution not too strong, the blue end of the spectrum is cut off, and two dark bands appear in the green, one close to Fraunhofer's line (*D*), and the other, which is a little broader, but not so well defined, is nearer to the blue. This appearance is not affected by adding ammonia, or the carbonated alkalies to the blood; but it is more or less quickly changed by the caustic fixed alkalies, by acids, heat, alcohol, &c.; and then the two bands in the green either disappear entirely, or they move lower down into the blue, which becomes much more discernible : besides which, there is a dark band in the red. This he found was the

* *Virchow's Archiv.* Vol. xxiii. p. 446 (1862).
† *Proceedings of the Royal Society*, Vol. xiii. p. 355.

spectrum of *Lecanu's hæmatin*, which had been formed by the action of acids, &c., on the cruorin of fresh blood.

Both of these colouring-matters are, however, susceptible of oxidation, and deoxidation, giving in each case a characteristic, but very different spectrum.

Fresh blood, dissolved in water, and made alkaline with ammonia, gives the spectrum of *scarlet* or *oxidized cruorin*, with its two well-defined absorptive bands in the green; but if to this alkaline solution of the blood there is added a little protosulphate of iron, to which enough tartaric or citric acid has been added to prevent its precipitation by the ammonia, the colouring-matter is reduced, or deoxidised by the protosulphate of iron, and the spectrum is changed to one with a single dark band in the green—the band being broader than either of the preceding, and occupying the place which was between them, as if the two bands had come together. This is the spectrum of *purple* or *reduced cruorin*; for, on allowing the solution to stand exposed to the air, it quickly absorbs fresh oxygen, and again becomes scarlet cruorin with its two absorptive bands. An additional quantity of the protosulphate will again reduce it, and so on for many times.

Professor Stokes has ascertained, beyond all question, that this change is not due to the spectral properties of the iron, but to changes in the colouring-matter itself; for, by using other deoxidizing agents, as protochloride of tin, hydrosulphate of ammonia, &c., the effects are the same, although they take place more slowly. Even blood itself, when it has been corked up, or otherwise placed, so as to be excluded from the air, and has become slightly putrid, exhibits the same single dark band of deoxidation; but on exposure to the air it quickly absorbs oxygen, and shows the spectrum of scarlet cruorin. Professor Stokes infers from this that "*the colouring-matter of blood*, like indigo, *is capable of existing in two states of oxidation, distinguishable by a difference of colour, and a fundamental difference in the action on the spectrum. It may be made to pass from the more to the less oxidized state by the action of suitable reducing agents, and recover its oxygen by absorption from the air.*" The importance of these reactions, and of this conclusion, will be best seen when we apply them physiologically.

When a little acid, as acetic, tartaric, or citric, which does not

give a precipitate with the colouring-matter of the blood is added to it, the solution quickly changes from a red to a brownish red colour, and the spectrum is no longer like that of fresh blood ; for the two bands in the green gradually disappear, or pass downwards into the blue, and there is a distinct band in the red. The change is evidently of a chemical nature, for nothing will restore the colouring-matter to its original condition.   The cruorin, in fact, is permanently changed into another substance—the hæmatin of Lacanu.   But this also, like cruorin, can exist in two states of oxidation, and give two characteristic spectra.   The spectrum of *oxidised hæmatin* is that already described ; it exhibits a faint absorption-band in the red, and two in the green, or rather one in the green, about the position of the lowermost black band of scarlet cruorin, and another in the blue.   By candle- or lamp-light, the last band is obscured in consequence of the comparatively small amount of blue in the light ; but, by daylight it is very distinct ; and if the strength of the solution is gradually increased until the red rays alone pass through it, the band in the blue is the last to go, whereas, with scarlet cruorin, the last colour to fade is the green between its two dark bands.

In order to see the spectrum of *reduced hæmatin,* it is necessary to obtain the colouring-matter in a somewhat pure condition, because the addition of ammonia to the impure acid solution will render it turbid, and so obscure the field of view.   The process to effect this is to acidulate a strong solution of blood, or blood-clots, with a little glacial acetic acid, and then to add about two or three times its bulk of æther, and gently move about in a test tube until the æther dissolves the acid colouring-matter, and floats without frothing. This is to be poured off ; and if it be at once examined, it will give the characteristic spectrum of *oxidised hæmatin* in a very marked manner.   But for *deoxidation,* it must be washed with a little water to remove the excess of acid, when the colouring-matter separates, and forms a film or layer between the æther and water.   The latter is to be drawn off with a pipette or syphon, and the æther with the colouring-matter is to be treated with a slight excess of ammonia, in which the hæmatin dissolves.   This gives a spectrum with a black band, obscurely divided into two at the line (D) of Fraunhofer.   If to this is added a small quantity of the solution of proto-sulphate of iron with tartaric acid, it exhibits a spectrum with two dark and

well-defined bands in the green, not much unlike the two bands of scarlet cruorin, but placed lower down, and their relative widths are different from those of fresh blood, for the uppermost is the widest and best defined, instead of the lowermost. On exposing the reduced hæmatin to air, it again absorbs oxygen and becomes the oxidized hæmatin. Professor Stokes names these also from their colour— *brown hæmatin and red hæmatin.*

These reactions are so delicate, and withal are so characteristic, that they may be used as the means of discovering the presence of a very minute quantity of blood; but to this end it is necessary that they should be used with microscopic appliances. This was first

FIG. 5.
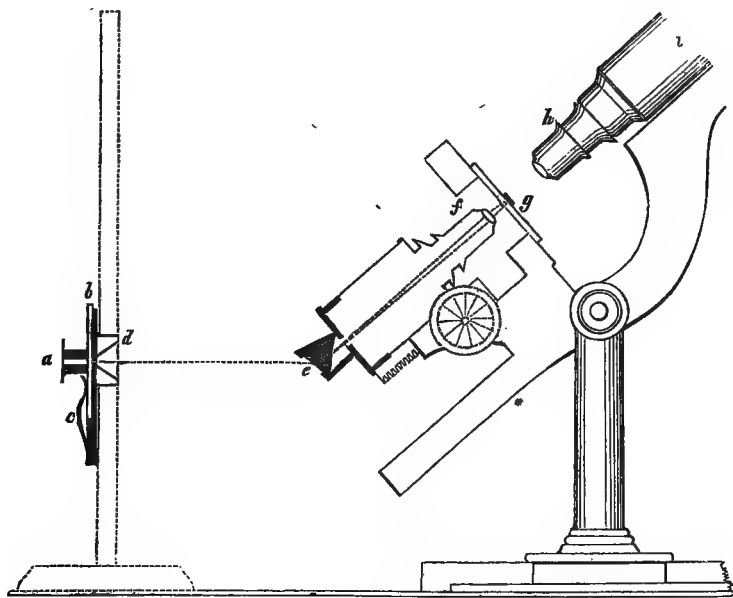
done by Mr. Sorby, who put the solution of blood into very small cells or tubes, made out of barometer tubing, of one-eighth of an inch bore, cut into half-inch lengths, and cemented upon a slip of glass. The apparatus and the arrangement of it are shewn in Fig. 5. The solution of blood is contained in the barometer tube (*a*), which is fastened upon the glass (*b*), and held in its place by the

spring (c), in front of a narrow slit (d). All these are supported on a moveable stand.   In front of the tube (a) there is a lamp so placed that its light, when condensed by a properly placed condenser, passes through the solution of blood to the glass prism (e), and thence by the acromatic condenser (f), to the object-glass of the microscope (h), and so on to the eye; or if more convenient, the object may be placed upon the stage of the microscope at g, and examined by the light which has passed the prism.   In both cases, however, the spectrum of the object is seen in the microscope, and the appearances are so well marked, that as little as the $\frac{1}{1000}$th part of a grain of blood may, according to Mr. Sorby, be discovered by this means.*

But it was soon found by Mr. Sorby that it would be more convenient to have the prism in the eye-piece of the microscope, with such an arrangement that the object might be examined in the usual way by direct light; and although the difficulties of effecting this were very great, yet he overcame them at last; and with the assistance of the practical skill of Mr. Browning, the well-known optician of the Minories, he constructed a spectroscope that can be used in the same way as the eye-piece of a microscope.   Its form and arrangements are seen in Fig. 6, and it consists of prisms for direct vision, so arranged that the spectra of two objects can be seen in the field of view at the same time, one of the objects being placed upon the stage of the microscope, while the other is placed upon the stage of the spectroscope.   In this way the spectra of an unknown object can be compared with that of a known, and the position of its absorption-bands accurately determined.   There is also an adjustment for altering the width of the slit, so as to obtain in every case the maximum effect; and when the slit is fully open, and the prisms are removed, the eye-piece may be used in the usual manner for finding and examining the substance.   By this means the highest power of the microscope may be employed; and it is said that the characteristic spectrum of a single blood-disc may thus be obtained.

One of the principal facts elucidated by Mr. Sorby is that blood in drying and keeping in common atmospheres undergoes change. It acquires, as everyone knows, a brown colour; and this he finds is due to the presence of acid matter in the atmosphere, which converts scarlet cruorin into a brown variety—having a

* *Journal of Science*, April, 1865, p. 211.

characteristic spectrum.   If recent blood, for example, is dissolved

FIG. 6.

in water, it gives the spectrum No. 2, Fig. 7, which is the spectrum of *scarlet cruorin,* with the blue end darkened, and the two dark absorption bands just below Fraunhofer's line (D) ; but if the spot of blood has been exposed to the air, so as to become brown, its solution furnishes a spectrum like No. 3, in which the two bands in the green are much weakened, and another band appears in the red. If the exposure has been for a longer time, it looks like No. 4, when the red band is still stronger, and the two green ones still paler. A larger quantity of blood is also required to show these spectra; and if the solution is very strong it only gives a dirty brown spectrum with a dark band in its centre.

The time necessary for these changes varies with the locality, and the circumstances under which the blood-spots have been kept. Exposed to the air at Burbage Moor, six miles from Sheffield, and

one or two miles from any houses, he found that it took a week to

FIG. 7.
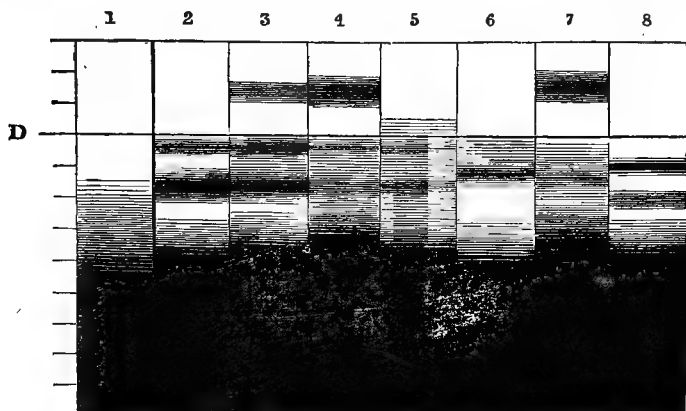
produce any appreciable change ; whereas, in the centre of the town of Sheffield, it occupied only a few hours. He further observed that when the blood-spots were kept in his own house the rapidity of change was much affected by the combustion of gas ; and hence he concluded that it was due to the formation of some acid compound, probably sulphurous acid by the burning gas. He then found that, when the blood-spots upon a piece of linen were sealed up in a glass tube, in a perfectly dry state, it required two or three months to produce a change that would show the spectrum No. 3 ; but if it was sealed up wet it did not undergo any change. It would seem, therefore, that there are three forms of *cruorin*, namely the *scarlet*, the *purple*, and the *brown*, each of which gives its characteristic spectrum.

In all cases of medico-legal inquiry, the method of proceeding with the examination of blood-spots should be as follows :—If the blood-stain permits of the removal of the blood without admixture with the tissue or fabric upon which it rests, it is proper to detach a portion of it in this manner, and dissolve it in a single drop of water in a watch-glass, and then to transfer it by means of a glass-tube drawn out to a fine point, to the cell made in the way already described, from a piece of barometer tube.* After which it is to be covered with a piece

* These cells should be made of tubes of various sizes and lengths to suit different circumstances, as of tube from one-tenth to a quarter of an inch

of thin microscope glass, and allowed to stand in a horizontal position, for ten minutes or a quarter of an hour, until the suspended insoluble matter subsides, and leaves the solution clear, and fit for observation. It is then placed upon the stage of the microscope, and examined with a magnifying power of from half-an-inch to a-quarter, taking care that the top of the liquid is brought into focus.   When this is done the prism of the spectroscope is to be put on, and the slit narrowed until the bands in the spectrum become distinct.   If the blood is moderately fresh, it will show the spectrum No. 2, Fig. 7 ; but if it is not so fresh, it will look like No. 3 or No. 4, according to its age.   On adding a little ammonia to the solution, the band in the red of No. 3, or No. 4, immediately disappears, and those in the green become strengthened, as in No. 5.   A minute fragment of citric acid is now to be added, and stirred into the solution with a fine platinum wire. This will weaken the dark bands in the green, or even make them disappear altogether, if the acid has been added in excess. Should this be the case a little more ammonia must be used, and then a very small particle of the crystal of green protosulphate of iron, the cell being immediately covered with a piece of thin glass, and secured with gold size, so as to exclude the air.   On turning the cell over and over for a few minutes, the protosulphate of iron will dissolve and deoxydize or reduce the scarlet cruorin to the purple— forming a pale red liquid, which will give the spectrum No. 6, with a single dark band in the green.   The specimen may be thus preserved for many months.

A little of the solution of the blood may also be dried upon a piece of glass, when it will give the spectrum No. 2, No. 3, or No. 4, according to its freshness and hygroscopicity. If it be very fresh and dry, it will look like No. 2 ; but if it be changed into brown cruorin the two bands in the green will be much paler, and when it is breathed on, so as to make it a little damp, it will show the band in the red like No. 3, or No. 4 ; the dry spot may be thus preserved upon the glass for months without change, provided it is covered with a piece of thin glass, and secured with gold size, or Canada balsam.

If the blood be very old and has become changed into hæmatin, it will not dissolve in water without the assistance of a vegetable acid ;

bore, and from one-half to three-quarters of an inch in length, ground flat at the ends, and cemented upon slips of glass.

it is, therefore, to be treated with a drop of water acidulated with citric acid, and the solution transferred to the cell, and examined as before.   Under this treatment whether the blood be new or old, it will be changed into hæmatin, and will give the spectrum No. 7, with its characteristic band in the red, another in the green, and if seen by daylight there will be one in the blue.   On adding a little ammonia, so as to make it distinctly alkaline, and then a very small particle of proto-sulphate of iron, it will be reduced, and will give the spectrum No. 8, with its two bands in the green; as in the former case, the cell must be covered with a piece of thin glass, and secured with gold-size, to exclude the air, when it will keep for months unchanged

It thus appears that a very minute particle of blood may be made to furnish its characteristic spectra; and when, in a medico-legal inquiry, these spectra are compared with the known spectra of blood, treated in exactly the same way as the suspected matter, the results are very conclusive.   In fact there are no real fallacies to the tests; for although many red solutions may produce stains upon clothing like blood-stains, and may give spectra, which at first sight appear like one or other of the blood spectra, yet there are none which show all the characteristic appearances of blood under the action of different reagents.   Few indeed, if any, will stand the test of ammonia, which only brightens the absorption bands of blood, while it alters the appearance of other colours; and if there be any doubt in the matter, a little sulphite of potash will remove it, for this bleaches every colour which is likely to be confounded with blood.   Among the reds which cut off the blue end of the spectrum, and exhibit black bands in the green, that are more or less like those of blood, are cochineal, lac-dye, alkanet, madder-red, and munjeet dissolved in each case, in a solution of alum; but on comparing the spectra, side by side, with those of blood, it will be at once seen that the bands are not the same, either in their position or character.   In the case of cochineal in alum, for example, which is so very like blood, that it might almost be mistaken for it, the two bands are nearly of the same width, whereas, in blood, the lower band is always the widest; and the reverse in the case with alkanet in alum.   Besides which, none of these colours will stand the action of ammonia.   Even the gravy of roasted meat, if it be not from underdone meat, which is

more or less modified cruorin, does not give the same spectra as blood; for although it sometimes shows a dark and sharply defined absorption-band, a little below the line (D), like that of reduced cruorin, yet ammonia weakens it, and citric acid, with proto-sulphate of iron, produces no change in it, as it does with hæmatin. In fact, if the gravy is very dark coloured, and has been strongly heated, it gives a spectrum, like No. 1, Fig. 7, without any absorption-bands. There is, therefore, no colour, as yet examined, which can, with proper care, be confounded with blood. A few precautions, however, are always necessary to guard against possible sources of error, and to obtain the most satisfactory results.

In the first place, the solution of blood should not be too strong, for, if it is, it cuts off too much of the light, and the absorbtion-bands merge into each other, and are not seen. On the other hand, if the solution is too weak, the bands are faint and are therefore not well marked. This, however, may be remedied by using a very narrow tubular cell, and thus increasing the depth of the liquid.

Secondly, the reagents, especially the citric acid and proto-sulphate of iron, should be employed in very minute quantity, as the hæmatin produced by the action of the acid on blood is not very soluble in a strong solution of citrate of ammonia, and will, therefore, be precipitated when the acid solution is neutralized, or rather supersaturated with ammonia; and the precipitate obtained by adding too much proto-sulphate of iron to the alkaline solution of blood, will obscure the field, and thus mask the absorption-bands.

Thirdly, it is necessary to throw the object a little out of focus, or there will be lines in the spectrum which are not due to the colouring-matter.

Fourthly, the width of the slit should be adjusted during the examination, so as to obtain the best effect, for, by narrowing the slit, the absorption-bands become more defined, and therefore more distinct.

Fifthly.—It is well to note the differences in the spectra with daylight, and artificial light; for, as the latter contains more yellow rays than the former, there is a comparative feebleness of the blue end of the spectrum, and it is consequently shorter. In my opinion, the results are most satisfactory with artificial light, as the flame of a paraffin lamp, or of gas, and the Drawing, Fig. 7, represents the appearance under these circumstances.

The delicacy of the spectrum-test is very remarkable. Mr. Sorby says, in a communication to me, that the $\frac{1}{100}$th of a grain of liquid blood may readily be made to exhibit all the characteristic spectra,—even so small a quantity as the $\frac{1}{300}$th or the $\frac{1}{1000}$th of a grain of blood, may be discovered after a little practice, by using a tubular cell, the $\frac{1}{10}$th of an inch in diameter, and an inch in length. When the blood-stain is upon white linen, a piece, not larger than the $\frac{1}{8}$ of an inch square, is generally sufficient for the inquiry, but all the spectra are not equally well seen with the same amount of material. If, for example, one part of blood will give the spectrum No. 8 (Fig. 7), it requires two parts to produce the spectrum No. 2, and about ten parts for the spectra Nos. 4, 5, 6, and 7. It follows, therefore, that the most satisfactory results are always obtained by dissolving the blood in a little water, acidulated with citric acid, and then supersaturating with ammonia, and reducing with a very little proto-sulphate of iron.

As examples of the delicacy of the test, and also of the time which may elapse after the blood has been drawn, before it loses its properties, the following may be quoted :—In the year 1849 I had occasion to make a medico-legal investigation of some blood-stains upon linen, and the specimens which have been kept from that time to the present, have been recently examined, both by Mr. Sorby and myself. The stains were of a brown colour, and were quite insoluble in water,—showing that the cruorin of the blood had been completely changed into hæmatin; but on treating a piece of the stained linen, not larger than a quarter of an inch in diameter, with a weak solution of citric acid, the colour was completely dissolved, and there was obtained a pale yellow solution, which, in its acid condition, hardly showed a trace of the characteristic blood-spectrum of oxidised hæmatin. When, however, it was made alkaline with ammonia, it exhibited the two faint bands in the green, which are characteristic of alkaline hæmatin; and on adding a minute fragment of proto-sulphate of iron, the spectrum of deoxidised hæmatin, with its double band in the green, was well seen. A like result was obtained with another medico-legal specimen of blood, dated 1851, and with some more recent specimens of blood which I have had to examine, as in the case of the Ilford murder, in September, 1865, and of Mr. Briggs in July following, and the Plaistow murder in

November of the same year,—in all of which cases the spectra are still very characteristic, although the blood, in every instance, is changed into the insoluble form of hæmatin. It thus appears, that the characteristic properties of blood are not lost after a lapse of seventeen years, but that the spectra are still as distinct, and as well marked, as with blood of only a few months old.

Mr. Sorby has carefully inquired into the impediments to the action of the test, and he finds that some dyes, especially those which have been mordanted with alum, and certain astringent substances, as the tannin of leather, and many hard woods, as well as soap, alcohol, acids, heat, and time, change the colouring-matter of blood into hæmatin, and so make it insoluble in water. It is possible, therefore, that these may offer impediments to the recognition of blood, especially if it be examined in a recent condition; but the difficulty is easily overcome by dissolving the blood in a little water, acidulated with citric acid, and then looking for the spectra of alkaline and reduced hæmatin. An experiment should also be made by putting a little blood upon the questionable fabric, and after it has become thoroughly dry, examining it for its spectra, and thus determining what are the real effects of the dye or astringent matter upon it. In this way all possible sources of fallacy and impediment are removed; and if to these are added the microscopic and chemical characters of blood,—as the presence of blood-corpuscles or their fragments, the forming a red-coloured solution, which is not easily bleached by chlorine or sulphurous acid, but is coagulated by heat or nitric acid, the results are conclusive.

In a physiologrcal point of view, these reactions of cruorin, as studied by its different spectra,—showing how greedily it absorbs oxygen, when exposed to the air, and how readily it gives it out again, under the influence of reducing agents, are especially interesting, for they throw a light on the probable function of the colouring-matter of the blood. They prove also that the peculiar red pigment of the blood-corpuscle has not yet been studied, except in the form of Lecanu's hæmatin, which is undoubtedly an altered condition of it. Grave doubts have, for a long time, been entertained of the identity of this substance with the colouring-matter of the blood as it exists in the red corpuscles. Lehmann expresses himself very strongly on this point, when he says, that, unfortunately, it is by no

means certain whether it is a product of metamorphosis of the true colouring-matter of the blood, or whether the hæmatin, prepared by us, only bears the same sort of relation to that which exists in the blood-corpuscles as coagulated albumen bears to that principle in its fluid state.   We cannot isolate it in its soluble state from the globulin of the blood-corpuscles; hence we are only acquainted with it in its coagulated (and essentially modified) condition.*   In that condition it is a dark brown substance, insoluble in water, but soluble in weak vegetable acids and in alcohol acidulated with suphuric or muriatic acid.   These are the properties of the substance which gives the spectra of brown hæmatin, and it differs essentially from the cruorin of fresh blood. All our notions, therefore, of the physiological functions of the colouring-matter of the blood as deduced from the properties of hæmatin, are manifestly uncertain, if they are not actually founded in error.   It is true that the constant occurrence of red pigment in the blood-corpuscles, and the change of it from purple to red under the influence of atmospheric oxygen, and of red to purple in the systemic capillaries, where the blood parts with oxygen and takes in carbonic acid, are strong proofs of its taking an important part in the function of respiration, and in the metamorphosis of the tissues; but the precise way in which that change is effected could never be determined so long as there was any doubt of the exact relations of hæmatin to the true colouring-matter of the blood.   The uncertainty, in fact, which pervaded the subject, is well expressed by Lehmann, when he says, that all sorts of conjectures have been hazarded respecting it, and that it is unnecessary to consider any hypothesis until it has been satisfactorily ascertained whether the hæmatin in question actually stands in the same relation to the true pigment of blood as coagulated and uncoagulated albumen ; or whether artificially prepared hæmatin is altogether a product of decomposition of the actual pigment.   If hæmatin has the same composition, as that we prepare artificially, and if the only difference be that it exists in a soluble form in the blood-corpuscles, there is at once an end to all those very imaginative hyyotheses which assume that the iron takes a great share in the process of respiration, and that it is the conveyer of oxygen to the blood.

In further proof of the uncertainty of the subject, he says, " the

* Lehman's *Physiological Chemistry*, Vol. i., p. 299.

experiments of Bruch on the action of gases on the colour of the
blood, and the observations of Harless regarding the gradual destruc-
tion of the corpuscles of frogs' blood, certainly indicate that there is
a chemical action between the blood-corpuscles and their contents on
the one hand, and the inspired oxygen on the other, in which action
the hæmatin doubtless participates.   But the observations of Han-
nover, which show that persons whose blood is very deficient in red
corpuscles (chlorotic persons) exhale as much carbonic acid as healthy
persons, seem on the other hand to contra-indicate a direct relation
between the blood-corpuscles or blood-pigment an oxidation in the
blood.   We must, therefore, give up, for the present, all attempts
at understanding the function of the blood-pigment." *

Now, it is at this very point that the inquiries of Professor Stokes
and Mr. Sorby are so valuable, for they not only prove that the
hæmatin of Lecanu is not the same as the true colouring-matter of
the blood, but they also demonstrate the fact that this colouring-
matter is endowed with the remarkable property of freely absorbing
oxygen, and of as freely parting with it to reducing agents.   They
show, therefore, that we have in the colouring-matter of the blood a
substance which is especially well-suited for the purposes of respira-
tion.   Nor is this all—the passage of the colouring-matter of fresh
blood, from the state of oxidised or red cruorin, to that of reduced
or purple, is accompanied with the precise changes of colour which
mark the passage of arterial to venous blood ; and as the spectra in
the two cases of red and purple cruorin are so different from each
other, it was hoped that they might be the means of discovering the
real difference of venous and arterial blood.   With the view
of solving this question, Professor Stokes, assisted by Dr. Sharpey
and Dr. Harley, obtained venous blood from a living animal
and examined its spectral properties.   Every precaution was taken
to prevent the access of atmospheric oxygen, because of the greediness
with which it is absorbed.   A pipette was adapted to a syringe
filled with water, that had been carefully deprived of its free oxygen
by previous boiling and cooling without exposure to the air.   The
point of it was introduced into the jugular vein of a live dog, and a
little blood was drawn therefrom.   This was immediately examined
for its spectrum, but it showed the bands of *scarlet cruorin* : indeed,

* *Ibid*, p. 307.

the solution itself looked more like arterial than venous blood; and so far it was inconclusive: but, as Professor Stokes remarks, it does not by any means prove the absence of *purple cruorin*; it merely shows that the colouring-matter present, was *chiefly scarlet cruorin*. Indeed, the relative proportions of the two present, in the mixture of them with one another, and with colourless substances, can be better judged of by the tint than by the use of the prism; for, with the prism, the extreme sharpness of the bands of scarlet cruorin is apt to mislead, and to induce the observer greatly to exaggerate the relative proportions of that substance.* Besides which, it is very probable that the recently-boiled water absorbed the carbonic acid of the purple cruorin, and so destroyed or altered its characteristic spectrum.

Seeing then, that the change of colour from arterial to venous blood *as far as it goes*, is in *the direction* of the change from scarlet to purple cruorin, that scarlet cruorin is capable of reduction, even in the cold, by substances present in the blood, and that the action of reducing agents upon it, is greatly assisted by warmth, we have every reason to believe that a portion of the cruorin present in venous blood, exists in the state of purple cruorin, and is re-oxidised in passing through the lungs.

That it is only a rather small proportion of cruorin present in venous blood, which exists in the state of purple cruorin, under normal conditions of life and health, may be inferred, not only from the colour, but directly from the results of the most recent experiments.† Were it otherwise, any extensive hæmorrhage could hardly fail to be fatal, if, as there is reason to believe, cruorin be the substance on which the functions of respiration mainly depends; nor could chlorotic persons exhale as much carbonic acid as healthy subjects, as is found to be the case.‡

Additional light is thrown on this subject by the investigations of Magnus, which prove that both arterial and venous blood contain oxygen and carbonic acid, but the proportions in the two cases are different; for while, in arterial blood the proportion of oxygen to carbonic acid is as six to sixteen, in venous blood, it is only as four to sixteen. Other experiments have also proved that venous

---

* *Proceedings of the Royal Society*, Vol. xiii. p. 361.
† *Funk's Lehrbuch der Physiologie*, 1863, Vol. i. p. 108.
‡ *Op. cit.* p. 361.

blood will absorb more oxygen than arterial, and arterial blood than serum. Lehmann, in fact, found that a given volume of clot would take up twice as much oxygen as the same volume of serum. It would, therefore, seem not only that the colouring-matter of the blood is the real agent of respiration, but also, that both arterial and venous blood contain cruorin, in its two states, of purple and scarlet.

The tint of the blood is no doubt affected, to some extent, by other circumstances than the relative proportions of scarlet and purple cruorin; for the experimental researches of Nasse, Scherer, Harless, Lehmann, and others, have demonstrated that the *form* of the blood-corpuscle has something to do with the colour of the blood. When it is flattened, the blood looks brighter, and more arterial, than when it is swollen. Oxygen and many saline substances have the power of effecting this; while carbonic acid water and some other agents swell it. All these reactions, however, are very different from the specific changes of scarlet and purple cruorin.

Another important question is that which relates to the *condition* of the oxygen in scarlet cruorin; is it common oxygen combined chemically, or is it *allotropic,* or somewhat active oxygen, held to it by adhesion? The latter seems to be the true conditions of it; for if it is combined by a chemical power it is a marvellously weak one —something like that which fixes gases in water, or which holds the second molecule of carbonic acid in bicarbonate of soda, all of which are easily displaced. Professor Stokes took two portions of defibrinated blood, and, to one, he added a little of the reducing iron solution, while into the other he passed carbonic acid. The effects in the two cases were the same; the blood lost oxygen, became purple, and showed the spectra of reduced cruorin. Magnus also, has removed as much as from ten to twelve per cent., by volume of oxygen from arterialized blood by merely shaking it with carbonic acid. These experiments illustrate the weak affinity of oxygen for the colouring-matter of the blood, and they show, moreover, that the changes of colour, as well as the differences of the spectra, are not due to the *presence of carbonic acid ;* but to the *absence of oxygen.* It is on this account that the blood of animals asphixiated by drowning, by carbonic acid, by nitrogen, or by the exclusion of air from their lungs is always dark coloured—the oxygen having been consumed in the circulation, and not renewed. In the dead body also the blood becomes darker and darker, by a process of re-

duction which goes on as long as there is any free oxygen in the blood to consume.

And this continued process of oxidation is further proof, that the oxygen exists in a semi-active condition, and not in the state of common oxygen. Von Maack, indeed, found that even a solution of hæmatin would absorb oxygen and form carbonic acid; and the more recent experiments of Schmidt have demonstrated that the oxygen of arterial blood has the power of turning guiacum blue. This is a property of active oxygen, and he has, therefore, concluded that ozone exists in the blood.* " But," as Professor Stokes remarks, " if by ozone he merely means oxygen in any such state of combination or otherwise, as to be capable of producing certain oxydizing effects, such as turning guaicum blue, the experiments of Schmidt have completely established its existence, and have connected it with the colouring-matter of the blood,"† although they do not prove it to be that peculiar allotropic form of oxygen called ozone.

" Now in cruorin we have a substance admitting of easy oxidation and reduction; and connecting this with Schmidt's results, we may infer that scarlet cruorin is not merely a greedy absorber and carrier of oxygen, but also an *oxidizing agent*, and that it is by its means that the substances which enter the blood from the food, setting aside those which are either assimilated or excreted by the kidneys, are reduced to the ultimate forms of carbonic acid and water, as if they had been burnt in oxygen." This is the conclusion arrived at by Professor Stokes, and it is fully borne out by the results of spectral analysis. Moreover, it would seem that the semi-active state of oxygen is acquired in the same way, as we see it manifested in powdered charcoal, in sand, in the soil, and in all kinds of finely divided matter.

As to the change which the colouring-matter of blood undergoes, when it passes from cruorin to hæmatin, we have but little knowledge, except that it occurs spontaneously, and under the influence of very slight causes. How far this may be concerned in the development of pathological phenomena is hardly to be surmised. The different appearances of the blood, in certain diseases, not only when it flows fresh from the vein, but also when it is seen in the

* *Ueber Ozon im Blute.* Dorpat, 1852.
† *Op. cit.* p. 363.

dead body, may, perhaps, be due to abnormal differences in the proportions of scarlet and purple cruorin, or even to the presence of their altered products—hæmatin.   Already the observations of Engel and Rokitansky have discovered a more than possible connexion between the colour and consistence of the blood in the dead body, and its tendency to soak or diffuse into the tissues, and accumulate in certain organs, and they have even classified these physical properties of the blood into six kinds—each characteristic of a special group of diseases.   And if to these observations, which are purely pathological and anatomical, there are added the exact investigations of the chemist, and the careful results of a searching spectrum analysis, we may hope for a rich accession of scientific facts.

The dark colour of the blood, in nearly all cases of acute poisoning, may also, perhaps, be due to the same cause, and be elucidated by the same methods of research.   Dr. Harley found, in his experiments on blood, that different poisonous agents operated very differently in promoting or checking the absorption of oxygen and the evolution of carbonic acid,* and it would be very interesting to determine by means of the prism the altered condition of the blood in all such cases.

And then, again, the peculiar changes to which the colouring-matter of the blood is subject, when it passes from its natural colloidal, or amorphous conditions to a crystalline, have yet to be investigated. It is very probable that there are many varieties of these changes—four, at least, have been observed, all characterized by their special crystalline forms.

Nor are these methods of investigation confined to the pathology of the blood, they are equally applicable to the elucidation of every kind of organic colouring-matter, as bile, the pigment of urine, and the *chlorophyll* of leaves.   Already much has been done in this direction by Professor Stokes,† and Mr. Sorby is now occupied in examining the spectra of the colours of flowers; while my own attention is being directed to the spectra of substances used in the falsification of wines, &c.; and we may look, therefore, to the prosecution of these inquiries for a rich accession of facts to chemistry, physiology, and pathology as well as to the more practical purposes of therapeutics and legal-medicine.

* *Proceedings of the Royal Society*, Vol. xiii. p. 158.
† *Proceedings of the Royal Society*, Vol. xiii. p. 144.

A LECTURE, WITH CASES, ON DIABETES,

By Dr. FRASER.

GENTLEMEN,—I shall not follow the usual line of clinical teaching, but give first a summary of the disease, as to its causes, diagnosis, and prognosis, and direct your particular attention to its treatment. You will be surprised and puzzled upon reading the literature of the subject, to learn how vague and undefined the views are now held upon points which were considered for many years fixed and certain. It is surprising, that a disease which must have been constantly under the observation of physicians, should have been first described by Dr. Willis, so lately as 1684, for it was he who drew attention to the presence of sugar in the urine, the pathognomonic symptom.

Writers divide diabetes into two species, viz. : diabetes mellitus, and diabetes insipidus. Of the former, the case before us, No. I., is an example, and No. VII., is an example of the latter. Many of the symptoms in both are nearly alike, but the characteristic difference is, that in the former the urine contains sugar, and in the latter it is absent; hence, diabetes insipidus, should not be considered under the head of diabetes, but more properly be looked upon as a diuresis. In the advanced stage of true diabetes, we can rarely, if ever, hope for a cure ; but, by our remedies and advice as to diet and habits, we can alleviate the symptoms, and prolong life, and the earlier the disease is detected, so will our success be measured.

What, thererefore, are the early ordinary symptoms ?

Slight febriculæ, a loaded tongue, intense thirst, pains in the back, and loins, skin dry and harsh, costive bowels, the passage of a large quantity of clear, or yellowish-tinted urine, generally of high specific gravity, and stated to have the odour of violets, or new-mown hay ; all this coupled with a great increase of appetite,

E

nevertheless, a progressive emaciation.   The quantity of urine passed
in some cases is enormous, in one case 12 pints per day; and
the solid contents of the urine excreted, often exceeds the weight of
both solid and fluid ingesta.   In a case in the Hospital, 60 ounces
of urine, in excess of the fluid drank, viz. : 145 to 205 in twenty-four
hours : this polydipsia arises from the rapid transformation of starchy
foods.   Now, as all the foregoing symptoms, except the great appetite
sometimes approaching to bulimia, may accompany various diseases,
they, except the bulimia, lose value as positive points of diagnosis
in the early stage; and, therefore, whenever you meet with a case con-
joining more or less the foregoing symptoms, do not delay to inquire
as to the quantity of urine passed in the twenty-four hours, and if you
find that the quantity ranges more than 40 ounces daily, and the spe-
cific gravity above 1·030, although in true cases of the disease, it is
sometimes, but very rarely, so low as 1·010, and albuminous, you
must therefore guard against the latter possibility; your suspicions will
now be more raised, and you will proceed to verify or dismiss them,
by examining with the usual tests for sugar, all of which you will find
in the different test-books.   You must, however, remember that the
mere presence of sugar in the urine; does not constitute diabetes,
unless it is persistent, and in large quantities. As much as one ounce
of sugar has been extracted from one pound weight of urine.   Our
late resident medical officer, Dr. Woodman has shown, but previously
demonstrated by Brücke, that traces of sugar exist in the urine of
many cases of other diseases ; more than ·5 per cent. of sugar in the
blood will give rise to diabetes.   You will remember that the two
symptoms, viz. : great thirst, and great appetite, are rarely, if ever,
conjoined in other diseases, therefore they are to arrest your attention.

The other symptoms attending the advanced stage are : heat, and
uneasiness in the epigastric region ; despondency ; depressed energy
of mind and body, a permanently quickened pulse ; and now, other
organs of the body become diseased, most frequently the lungs,—in-
deed a large proportion of all cases of this disease die from pulmonary
affections.   Of the remote causes of this remarkable disease, we are
still profoundly ignorant ; in books we are told that :—

"It is owing to the conversion of fæcula into sugar."—*Bour-
chardat.*

" It is pretty clearly traced to changes in the action of assimilation,

and in the constitution of the blood, not strictly speaking, to morbid action of the kidneys."—*Alison*.

"A large quantity of hydrated starch (glycogen) is continually formed in the liver, which, on contact with the blood, is transformed into sugar, and is removed as carbonic acid by the lungs : but if the glycogen be in excess, or if the action of the lungs be defective, it passes off as sugar by kidneys, and constitutes diabetes."—*Bernard*.

"It depends on the sugar normally existing in the blood being undestroyed, and unappropriated."—*Von Durch*.

"It arises from the arrested metamorphosis of the sugar formed in the liver."—*Frerichs*.

"It appears very probable that the sugar is formed, not in any single organ, but that it is produced by a diseased condition of the whole system."—*Simon*.

"It is nothing more than a form of dyspepsia consisting in a difficulty of assimilation of the saccharine alimentary principle."—*Prout*.

Others have alleged that it is a disease of the lacteal vessels, disease of the kidneys, a change in the animal electricity of the kidneys, and so on. There is scarcely an organ or function of the body which has not been called upon to explain the predisposing, exciting, and proximate causes of this disease.

Light or reddish-haired persons, are said to be more liable.

It is less frequent in women.

There must be some concomitant circumstances required before this disease arises, altogether apart from the effects of diet or any ordinary external conditions; otherwise, how are we to explain the comparative rarity of the disease among so large a number of similar circumstanced persons? The highly interesting experiments by Drs. Pavy and Bernard bear upon this point, as also does Dr. Brown-Séquard's very curious fact, that by pricking the mesial line of the fourth ventricle of rabbits, a saccharine condition of the bile and urine may be induced. Schiff has also shown that the introduction of needles into the liver in rabbits may produce diabetes, and it is known that certain nerve injuries may have the like effect. All these facts prove that there is an undiscovered cause for this disease.

The saccharine condition of the urine induced by these nerve or organic injuries, never induce true persistent diabetes, which shows that the true disease has a deeper-seated cause than a mere saccharine

diathesis, which may be after all a mere symptom. In the diabetic stomach every starch material is greedily seized, and quickly converted into sugar, whereas no such thing occurs in a healthy stomach: Bernard thinks that the process is completed in the liver during life, but Pavy dissents from this opinion, and considers it an after-death effect. That special circumstances must be present, is also proved by diabetes not being produced, while a saccharine diet is employed, as shown at p. 53, also by Case 3, p. 50. This question is still undetermined, but our time permits only an allusion to the difficulties, only observing that there is ample inducement to any one of you to pursue this important inquiry. In the supposed causes of this disease the humoral pathology is called upon to play a prominent part, and a change in the composition of the blood unfitting it for the supply of new and healthy tissues, is said to be the chief cause of the disease. The prognosis is always unfavourable ; the disappearance of the symptoms, and the appearance of uric-acid in the urine are the favourable signs.

The disease may endure for weeks to six months, and even to several years.

Morbid appearances.—Every organ of the body has been found in different cases more or less diseased ; but most frequently the lungs (said to be of a non-tubercular character), and kidneys : the liver is said to be firm, and tough to the touch.

Nearly a half of diabetic patients die of lung-disease. Whether these morbid appearances are effects or causes, the present state of our knowledge does not enable us to determine.

The kidneys are quite as frequently healthy as diseased. If the presence of sugar in the blood were the cause of the organic affections, some of these ought always to be found, which is not the case.

To explain the absence in many cases of all morbid appearances, many persons think that the cause of the disease is merely functional ; but if this be so, how is it that the disease is so obstinate, and too often incurable ? However, if hepatic congestion, consequent on muscular action, will induce diabetis, it would show that saccharine urine may proceed from mere functional disorder.

Treatment.—When we consider that we know little or nothing of either the predisposing, remote, or proximate causes of the disease, it will be manifest that our treatment with drugs must be more or

less empirical : also, when we consider how many different opinions have been offered as to the causes of the disease, you will expect to find an equally discordant array of drugs which have been recommended.

All the preparations of iron, but the tincture of the sesqui-chloride, the phosphate, the ioduret, have been the most lauded : the latter has been given from twenty to thirty grains thrice a-day.

Carbonate of ammonia during the day, and opium at night, has been very successful in the hands of Bourchardat; Citric acid, saturated with chloride of sodium, is said by Wright to be a specific; Elaterium has been much recommended by Dr. Bright; the tartrate of antimony by Dr. Barlow; fresh rennet by Gray and Bennet; a mixture of lime-water, and liquor ammonia by Dr. Collis; sodæ-potassio-tartras, up to an ounce per day, by Dr. Pavy; Dover's powder, cod-liver oil, the permanganate of potash, the peroxide of hydrogen, glycerine, the chloride of arsenic, all the alkalies, and all the acids; bleeding also, has had its chance, especially by Drs. Watt and Satterley; and even sugar itself has been recommended, and tried; and although, upon one occasion, my Case, No. 3., I employed it, I have no explanation to give as to the expected " *modus operandi*." The non-effect does not meet the view of Griesinger, who has stated that the continued administration of sugar will lead to permanent diabetes : nor did any of the symptoms described by this writer occur, such as dreams, depression, and a general feeling of illness.

It struck me that if sugar as a food was so injurious that some evidence of its evil action should be obtained among the negroes on sugar-plantations, and upon making inquiry of Dr. Campbell, whose quality for observation is undoubted, I received the following reply in writing, " My experience as to the occurrence of diabetes among the negroes of Jamaica while engaged in the manufacture of sugar, is that the disease is extremely rare; in fact, I have met with it in two negroes only, and only once in a European during the course of a residence of twenty years. During the crop-time, the negro is permitted to eat sugar to any extent, and he increases in fat, and the skin assumes a peculiarly sleek and glossy appearance. The same thing is observed in certain districts during the mango season, when the negro almost entirely subsists on that fruit, which

contains a very large amount of sugar." All this goes to show that the sugar is derived *ab intro*, and that the system in the diabetic is, so to speak, saturated with sugar, and no more can be taken up, and consequently the amount taken by the ingesta, is thrown off by the intestinal excretion, where it may possibly be found unchanged. If this be a fact, the conclusion is inevitable, that our endeavours to reduce by a non-saccharine diet the amount of saccharine secretion are valueless, and that we must seek for a remedy for this disease which will arrest the sugar-forming process going on within.

Most of, if not all, the remedies for this disease have been given under the view of acting chemically upon the supposed morbid material, and if we could always apply our remedies upon this principle correctly, our success in cure would often be great, but unfortunately it is not so, and we cannot always give a reason for employing one drug, more than another, although let us strive to follow this rule.

However, as an inducement to you to pursue the highly-interesting study of the physiological action of drugs, I will give you a few illustrations, as to their supposed action in the disease.

The permanganate of potass, and the peroxide of hydrogen are each supposed to cause a large evolution of oxygen gas, by which the farinaceous foods are oxidised in a higher degree than sugar, consequently no sugar is formed. Creosote acts by arresting or delaying the saccharine fermentation, consequently digestion is finished, and the materials removed before sugar can be formed.

Opium acts by arresting the secretion of urine, as it does all the secretions, except that of the skin. Hydrochloric acid would seem to act simply by improving the digestion.

Antimony, and all diaphoretics act by lessening the labour of the kidneys, and consequently a less amount of material passes through the kidneys, and proportionately a less quantity of sugar is passed. This theory infers that the sugar is formed in the kidneys; which late observations have disproved.

Ammonia.—The theory of its action, supposes that both in healthy and diabetic persons the starch is equally converted into sugar, and that in health it is metamorphosed and burnt off by the alkalies; but that in diabetes, there being a deficiency of alkali in the blood, the sugar is passed off unburnt by the kidneys. Phos-

phoric acid is supposed to supply the deficiency of the animal salts;
on the other hand, this acid has been found by some to *increase*
the quantity of sugar.

If we believe, with Prout, that no *known* remedy exists in which
there is a specific action for improving the qualities of the urine,
and indeed that more injury than good has resulted from the too
ready application of specific remedies to supposed diseases or
functional derangements of the kidneys, we must turn our atten-
tion to something else; but we do not altogether agree with
Dr. Prout, inasmuch as we believe that most, if not all, of those
remedies have a more or less beneficial effect, whether by acting
directly on the organ which is most at fault, or as tending to the
improvement of the assimilative function, and consequent depu-
ration of the blood.

Whatever may have been our reliance upon drugs in the treatment
of this disease, we were always cheered by the hope that we could
hold the disease in check by a rigid rule of diet, excluding all
amylaceous and farinaceous substances, and substituting a diet con-
sisting exclusively of animal food, and avoiding all drinks containing
saccharine matter, if the patient would only submit to it; and if it
failed, the failure was attributed to a clandestine departure from the
rules on the part of the patient, or to an imperfection in the mode
of preparing the gluten bread especially, and Dr. Hassall has
shown how true the latter danger is, as in the ordinary gluten
bread there is 16·33 per cent. of starch; and in bran bread, as
usually prepared, there is also a large proportion of starch, but
our notions as to the utility of an appropriate diet has, the other
day only, received a very rude shock from Dr. Owen Rees, who
seeks to show that the exclusion of amylaceous and farinaceous
foods, from the diet of the diabetic, is not only useless, but dan-
gerous.   I have myself often had misgivings as to the necessity of
inculcating the absolute negation of all starch-carrying food, and
the imperative necessity for a large use of animal foods, generally to
the extreme disgust of the patient after a time; but that this strict
diet is useless, I am not prepared to admit—indeed, my experience
leads me to have good faith in a diet treatment.   May we not hope
that the failures spoken of by Dr. Rees have arisen from the im-
perfect elimination of starch from the foods, and that we may not be

compelled to ask : What are we now to do ? and be enabled to avoid exclaiming : *Hinc illæ lachrymæ.*

This application of diet will depend very much on the aptitude for certain foods of each individual case, as well as upon our peculiar opinions as to the cause and origin of the disease. If we believe that the cause consists in a too ready change of the fæculent portion of our food into sugar, then we ought to replace this by a food containing less fæcula, *i.e.*, bread made from gluten ; bran, or as lately recommended by Pavy, almonds ; on the contrary, if we believe that the chief cause of the disease lies in disordered assimilation, or, in other words, indigestion, then the indication is to restore the general health by ordinary diet, air, and exercise.

The best diet is considered an excess of butchers'-meat ; and it does not seem material which is employed, and, therefore, the taste of the patient, as much as possible, is to be consulted. Mutton-chops and beef-steaks, under-done, have been most recommended. The following is an extreme example of this style of diet :—

For a man, aged 40 : One pound of gluten bread ; two pounds of beef made into beef-tea ; quarter of a pound of ordinary beef ; four ounces of roast-veal ; six eggs ; two quarts of coffee. Malt-liquors are inadmissible, spirits are less injurious, and the best wine is dry claret.

In conclusion, the following points may be noted as still open for observation, partly suggested by Prout :—

1st.—Is the correspondence of the absolute diminution of the urea with the absolute increase of the sugar an invariable rule ? It is now generally thought that the absolute amount of urea is increased.

2ndly.—May not the nitrogen be removed from the system in some other way, probably in the form of ammonia compounds ?

3rdly.—Do the other secretions undergo a change, especially the bile ?

4thly.—Does the air, which is exhaled from the lungs, differ in composition from that expired by healthy persons ?

5thly.—Do the kidneys, liver, or lungs undergo any changes ? and if so, what is their nature ?

6thly.—Does the increased secretion of sugar depend upon an absolute increase of activity in the process by which the sugar is

formed; or from a cessation in the action of those causes which, in health, prevent the formation of the sugar ?

Case No. 1.—M. W., aged 62, admitted the 9th of October, 1861, states that she has gradually wasted for the past six months, having been previously in good health.

She has a great appetite, and suffers from an intolerable thirst, and passes an unusual quantity of water.   There are no other very marked symptoms, and there is an absence of the usual roughness of skin.   Weight five stone twelve pounds.   Specific gravity of urine before fermentation 1·026° ; after fermentation 1·003° ; loss 23° ; equal to twenty-three grains of sugar per ounce of urine ; equal to 5·29 per cent. of acid re-action.   Fluids taken six pints ; passed six pints.

Under treatment for 126 days.   For thirty-five days she had the peroxide of hydrogen three times a-day, beginning with two drachms. Ordered diet of chops, milk, rice-pudding, and sherry.   No manifest change of any one other symptoms.   For thirty-one days all medicine was intermitted.   A rigid meat diet was then enforced, with gluten bread, water-cresses, spinage, and claret wine, and as an extra drink, equal parts of lime-water and milk.   At the expiration of thirty-five days, she states that she feels better, and is more lively.   Specific gravity of urine 1·024° ; after fermentation 1·007° ; loss 17° ; equal to 17 grains of sugar per ounce, equal to 3·91 per cent. of acid reaction.   Fluids taken, four-and-a-half pints ; passed five pints. All medicine and restriction on diet abated for three days.

On the 1st of January, 1862, the iodine of iron was given, but it caused great nausea, and seemed to increase the thirst, and was consequently discontinued after four days' trial, a restriction of diet having been enforced during its use.

In six days after, viz., the 10th of January, all restriction on diet was removed, and she was allowed the full diet of the Hospital, namely :—

	12 oz. Bread.		
SUNDAY . . .	6 oz. Potatoes.	Gruel. 6 oz. baked Beef.	1 pint Broth.
	1 pint Porter.		
MONDAY . .	Ditto.	Ditto. 6 oz. boiled Mutton	Ditto.
TUESDAY . .	Ditto.	Ditto. 6 oz. baked Beef.	Ditto.
WEDNESDAY	Ditto.	Ditto. 6 oz. boiled Beef.	Ditto.
THURSDAY .	Ditto.	Ditto. 6 oz. baked Mutton	Ditto.
FRIDAY . . .	Ditto.	Ditto. 6 oz. boiled Beef.	Ditto.
SATURDAY .	Ditto.	Ditto. 6 oz. boiled Mutton	Ditto.

The iodide of iron was recommenced and continued for twenty-eight days, during which period she took 227 grains of the salt. At the expiration of the twenty-eight days the specific gravity of the urine was 1·027 ; after fermentation, 1·007. Weight five stone nine and a-half pounds.

A restricted diet was again reimposed, viz. : a mutton-chop ; half-a-pound of boiled beef ; a pint of strong beef tea ; plenty of greens ; and gluten bread, and soda-water for a drink. On the 8th of February, fluids taken, five pints, passed five pints. Specific gravity of urine 1·023, thirst much diminished : says she is much better, and was discharged at her own request.

CASE No. 2.—George E—., age 45, bootcloser, was admitted November 2nd, 1861.

This patient has led an extremely sedentary life, often remaining at his work for fourteen consecutive hours, most of the time sitting and stooping.

Has had occasional attack of dyspepsia.

About nine months ago he began to suffer from extreme thirst, accompanied by general weakness, and loss of flesh ; he also experienced a frequent desire to void his urine (not being able to retain it more than an hour and a-half at a time), which became very light in colour. Shortly after this his sight became affected, and this dimness of vision increasing, he was obliged to give up his work, and then he became an in-patient at the Hospital.

He is of short stature ; slightly deformed (from continual stooping), rather emaciated, with dark hair, and sallow complexion. Skin dry and rough. Pulse about 70 ; appetite very good ; complains of thirst ; is not particularly costive. Urine light in colour, of specific

gravity 1·032, shewing distinct evidence of the presence of sugar, which upon further examination, was found in a proportion of rather more than twenty grains in the ounce.

Under treatment for 215 days. At the commencement of the treatment on the 2nd of November, 1861, the specific gravity of the urine was 1·033. Fluids taken, five pints, passed five pints. For sixty-seven days took the peroxide of hydrogen, beginning at ʒj. up to ʒiv. ter die, with a diet restricted to gluten bread, chops, eggs, cresses, and spinage, with claret wine ; at the expiration of the period, the specific gravity of the urine was 1·030, loss by fermentation, twenty-eight grains, 5·06 per cent. of acidity. Fluids taken ten pints, passed ten and a-half pints.

For nineteen days he took the iodide of iron, with the full diet of the Hospital; at the expiration, the specific gravity of the urine was 1·029, after fermentation, 1·004, loss 25°. The thirst was increased.

For forty-eight days he had the potassio-tartrate of soda, under a restricted diet; at the expiration, the specific gravity of the urine was 1·029, and equal to twenty-one grains of sugar per ounce. Fluids drank, five pints, passed six pints.

For forty-five days he took the hydroclorate of ammonia in the day, and opium at night ; at the expiration, the specific gravity of the urine was 1·030. equal to twenty-five grains of sugar to the ounce of urine. Weight, on admission, seven stone one pound ; on dismissal, seven stone eight pounds. When discharged, he expressed himself as feeling very much better.

CASE No. 3.—C. M—., age 10. This girl was admitted on the 15th of January, 1861.

Her complexion florid, hair fair, eyes blue, skin dry and moist-less; is very emaciated, listless in her look, and lazy in her habits.

Four years ago had an attack of scarlatina, and during convalescence, enuresis was noticed, and general anasarca followed. These symptoms gradually disappeared, and she enjoyed a fair state of health, until six months ago, when she began to droop, and has gradually weakened.

At present her appetite is very great, and thirst inordinate. She

drinks about eight pints of fluid per day, and passes a larger quantity.   She weighs three stone six pounds.

Under treatment for 157 days, which is consecutively given.   For seven days the tincture of the sesqui-chloride of iron, and the tincture of opium, two and a-half minims of each three times a-day; diet unrestricted; no change took place; the density of the urine being 1·040.   For twenty-four days the peroxide of hydrogen was given, beginning with two drachms three times a-day, and increasing the dose up to six drachms three times a-day.   The diet restricted to butchers'-meat, watercresses, milk, and the best gluten bread. During this period the average specific gravity of the urine was 1·040° before fermentation, and 1·007° after fermentation, showing an average loss by urinometer of thirty-three grains.   The residue per ounce of urine, after evaporation, fifty-three grains.   The average fluid drank, six and three-quarter pints; passed, six and three-quarter pints.

For four days all medicine intermitted, but the restricted diet rigidly enforced.

Specific gravity 1·040, loss thirty-five grains.   The residue fifty-five grains after evaporation.   Fluids drank, nine pints; passed nine pints.

For twenty-one days the peroxide of hydrogen was recommenced, her weight being three stone seven pounds, nearly the same as upon her admission.   Specific gravity of urine 1·040, loss thirty-six grains. The residue after evaporation forty-eight grains; fluids drank, eleven pints; passed, eleven pints.

For twenty-eight days all medicine intermitted, but a rigid diet enforced, six ounces of Claret wine allowed.   Specific gravity of urine 1·042, loss forty-two grains, residue after evaporation fifty-five grains.   Fluids drank, seven pints; passed, seven pints.

For twenty-eight days all medicine intermitted; diet enforced, but, in addition, she was allowed white crystallized sugar *ad libitum,* in any way she chose to eat it.   During the twenty-eight days she swallowed twenty-four pounds of sugar.   Average specific gravity 1·041°, loss 41°; residue after evaporation, forty-seven grains to the ounce of urine.

For three days she had ten grains of pepsine three times a-day. Specific gravity 1·040; residue after evaporation, fifty-two grains per ounce.   Fluids taken, five and a-quarter pints; passed, six and a-half pints.

For forty-one days she took half-drachm doses of the syrup of the iodide of iron three times a-day. Average specific gravity of urine 1·039, loss thirty-eight grains; residue after evaporation, fifty grains per ounce of urine.

By this time she had become a mere living skeleton, and died exhausted on the 5th of March.

Post-mortem examination 6*th of March,* 1862.—*Body* much emaciated; *cadaveric rigidity* persistent.

Thorax.—*Right lung* slightly congested at the *base,* and deficient in elasticity. *Left lung* in a similar condition, and at the base of latter was a small round cretaceous mass, about the size of a pea, and of extreme hardness. *Heart* healthy.

Abdomen.—*Liver* weighed two pounds and a-half, and on the surface of the organ were a number of greyish-yellow spots and patches. Capsule extremely adherent. The surface shows both portal and hepatic venous congestion. On making a section the cut-surfaces were unctuous to the touch, and a number of patches of a yellowish-grey colour (fatty degeneration) were apparent. The walls of the bladder were found to be enormously thickened, and the muscular fibres could be seen in a highly-developed state through the mucous membrane : in some parts the *walls* of this viscus were a-quarter of an inch in thickness. The right kidney was healthy, although rather soft; the capsule was non-adherent; the left kidney was in a similar condition; the spleen was extremely small and exsanguine; mucous membrane of stomach soft and congested.

Cranium.—Sinuses of the dura mater were loaded, and the superficial vessels of brain much congested, and considerable sub-arachnoid effusion. The brain was firm, no evidence of disease in any of the ventricles.

CASE No. 4.—William B., aged 30, labourer, unmarried, was admitted June 6th, 1863. Preivous to his present illness, has been healthy, strong, and always capable of doing his day's work. His father and mother are both alive. The former has always been, and is now in good health. The latter has been consumptive for the last fourteen years, but, nevertheless, is not wholly incapacitated for work. The rest of his family has never suffered from any exhausting disease, nor has any of them, to his knowledge, presented symptoms similar to his own.

He first became ill about three months ago with symptoms of common cold, which, however, was shortly afterwards followed by swelling of the glands of the neck ; pains, and a sense of lassitude in all the limbs; loss of appetite ; and he gradually became thinner and weaker ; and about a fortnight ago he began to suffer much from thirst, often drinking two gallons of water a-day ; his appetite now became increased, so that (to use his own expression), " he could eat every thing that came in his way."

On admission he was much emaciated, the skin was hot, dry, and scurfy, had inordinate appetite and thirst. Tongue red, but not fissured. Urine of a pale-yellow straw-colour, having an odour resembling new hay, and which answered to the tests for sugar.   At the expiration of two months he left the Hospital at his own desire, as he considered himself quite recovered, although the great appetite and thirst, and the presence of sugar in the urine, gave evidence that the disease was not cured.

In Hospital sixty-five days.

On admission, specific gravity of urine 1·035° ; on dismissal, specific gravity of urine 1·030°.   At first no drugs were given ; but a rigid diet, as under, ordered.   The full diet of the Hospital, viz., as at page 58, and in addition a chop, two pints of porter, and two pints of milk.   This was continued for thirteen days with no important variation in the symptoms.   Upon one occasion the specific gravity of urine fell to 1·030, and upon that day the patient drank, and passed twenty-one pints ; and on another occasion the specific gravity rose to 1·038, and upon that day the patient drank twenty-four and-a-half pints, and passed twenty-two pints.   For forty-seven days the diet was a chop, half-a-pound of boiled mutton, beef-tea one pint, lettuce, and oat-cake for bread.   At one period an extra pint of beef-tea was allowed, the lettuce changed to cabbage, and an occasional bottle of bitter ale.   No drugs during these forty-seven days. The result was, that during the period the highest specific gravity was 1·034 ; the lowest was 1·027.   It is to be noticed that when the diet was changed at the commencement of the forty-seven days, the thirst was very great, fifteen pints being taken, and seventeen pints passed, and that immediately on the change the thirst decreased, and the quantity of fluid drank was restored to seven and-a-half pints, and passed four pints.   At the commencement of the treatment, there was thirteen grains of sugar to the ounce of urine, and

on going out there were five grains of sugar to the ounce of urine. It is a curious fact that oatmeal-and-water assuages the thirst more than any other thing when workmen are exposed to very high artificial temperature; so much so, that oatmeal is supplied in gas-works, &c., by the employers, and the men have found the advantage of using it from experience. This was stated to me by Dr. Ramskill.

CASE No. 5.—Robert A., aged 38, rigger, admitted the 25th of February, 1864, died 14th of June. The patient is a thin, spare man, with red hair, pallid face, and blue irides. He states that up to about five months ago he had always enjoyed good health, and had been a teetotaller for the last seven years. About this time he noticed that he was losing flesh, becoming weak, occasionally having night-sweats. He soon began to suffer intense thirst, which caused him to drink large quantities of cold water, and he soon observed that he was passing a great deal of urine, according to his estimation about twenty-four pints in twenty-four hours. During this time his appetite varied much; sometimes he would eat voraciously, and at others had almost complete anorexia. All sexual desire had left him at the commencement of the disease.

On admission he was pale and debilitated, with a perfectly dry skin, confined bowels, no appetite, and tongue dry, and coated down the middle. Weight eight stone ten pounds. There was also dulness on percussion at both apices, with a prolonged expiratory murmur. He was passing large quantities of urine of specific gravity 10·40, and containing about twenty grains of sugar per ounce.

He was ordered Mist. Sal. t d., his bowels kept open by gentle purges, and ordered a diet of gluten bread, green vegetables, chop, and a small quantity of stimulant.

He seemed at first to improve, but he soon began to feel weaker, and the signs of phthisis became more marked.

April 2nd.—He was much about the same, and was ordered Ammon. Sesqui-carbon. gr. x., Decoc. Cinchon. ʒj.

10th.—He is considerably improved, says he feels stronger, and his appetite is better.

15th.—Not so well, passing seven and eight pints of urine, of specific gravity 10.35 to —40. At this time crepitation was distinct at both apices. From this time, up to May the 9th, he improved considerably,

and at this time he only passed about five pints of urine, but the specific gravity and quantity of sugar was increased.

May 16*th.*—Not so well, the ammonia was left off, and ol. jecoris aselli given in its place. He now had a sore throat, the tonsils were inflamed, and the uvula being pendulous, and interfering with deglutition was cut off.

19*th.*—Throat quite well, and he expressed himself altogether better passing only three pints and a-half of urine with fifteen grains of sugar per ounce.

June 11*th.*— He remained in much the same condition up to this time as regards his urine, but the disease of his lungs, had made great progress, and he was getting weaker, and unable to eat his diet; he was allowed ordinary bread, and anything he could eat.

June 13*th.*—He was evidently getting weaker, and at two A.M. on the 14th, he died without any altered symptoms.

No *post-mortem* examination.

Remarks.—I consider that this man was very much benefited by the restricted diet, and also that the ammonia treatment was useful. This is another instance of the patient dying of pulmonary disease, and not of the diabetes.

CASE No. 6.—Stewart P., aged 40, has been in two hospitals, without benefit; ill two years, early symptoms, weakness, thirst, parched lips, anaphrodisia, increased quantity of water, cramps in legs, emaciation. Was in Hospital from the 24th of April to the 1st of September, 1851, during which time he ordinarily drank 70 ounces per diem, and voided, when first admitted, 120 ounces, specific gravity 1047. Solid matter in 120 ounces evaporated eleven ounces and a-half, weight 114 lbs.; during his residence, the highest specific gravity was 10·50, the lowest 10·25, just before his death; but still plenty of sugar. At one time he gained two pounds and a-half in weight. On one occasion fifteen ounces of solid matter was passed in 120 ounces of water. He took gluten bread for two months without apparent benefit. He had a variety of treatment—steel, creasote; the former caused diarrhœa, the latter seemed to agree. Before death he had several abscesses, and the fore-finger of right hand required amputation, having become gangrenous.

Post-mortem examination.—Head.—Brain rather soft, otherwise healthy.

Thorax.—In the upper margin of lower lobe of left lung was a cavity, and a few tubercles were studded throughout the lung, in right lung was a cavity, and a few tubercles.

Heart.—Healthy and firm ; small, weight six ounces and a-half.

Liver and Spleen.—Healthy.

Kidneys.—Right kidney, weight seven ounces, gorged with blood, papillæ enlarged ; left kidney, weight six ounces and a-half, healthy as regards colour and appearance ; inner surface of both renal capsules presented an ulcerated appearance. Sugar very perceptible in the urine which was drawn from the bladder after death.

1st of August, 1866.—The case of A. M., a woman aged 30, has been in the Hospital only a few days, and, therefore, no definite observations can yet be drawn, except that the intolerable thirst has been much relieved by the potassio-tartrate of soda in two drachm doses three times a-day ; beyond this quantity it purged. To relieve symptoms in this disease is a great boon to the patient, and we may congratulate ourselves that our mission is thereby not fruitless.

CASE No. 7.—*Diabetes insipidus.*—This case ought not to be considered a variety of the real disease ; it ought to be called " *Diuresis.*"

July 5th, 1863.—M. A., a girl of 12 years of age, had been observed for the previous six months to pass a large quantity of water ; there was not much emaciation, no increase of appetite, but inordinate thirst. She remained in the Hospital until the 11th of August ; during the whole period the specific gravity of the urine continued persistently at from 1·000 to 1·002. On admission, she drank from five to seven pints of fluid, and passed an equal quantity. The treatment adopted was the phosphate of iron, from ten to twenty grains three times a-day : during its use the thirst diminished, and the quantity of water passed proportionately diminished. For a time the diet was restricted to meat, eggs, and milk, but this system had no influence on the symptoms. On the 21st of July she drank three pints of fluid, and passed five pints of urine, and the estimated quantity of urea was 336 grains. This quantity varied, for, upon the 19th of the same month, she drank two pints and a-half, and passed five pints,

F

the urea being 240 grains; and upon the 22nd she drank three pints, and passed six pints, the urea being 148 grains.

The general opinion is that this affection is never idiopathic, but this case shows the contrary, as no special organic cause was here suspected.

A SHORT SUMMARY OF CASES. Nos. 1, 2, 3, and 4.

| No. of Case. | Before Treatment. | | Treatment. | No. of Days under Treatment. | After Treatment. | | Fluids Taken. Pints. | Urine Passed. Pints. |
	Specific Gravity of Urine.	Quantity of Sugar in grains per oz. of Urine.			Specific Gravity of Urine.	Quantity of Sugar in grains per oz. of Urine.		
1	1·026	23	Peroxide of hydrogen.	35	1·026	23	6	6
	1·026	23	No medicine; rigid diet.	31	1·024	17	4½	5
	1·024	26	No medicine; free diet.	3				
			Iodide of iron; rigid diet.	4				
			No medicine; free diet.	6	1·027	20		
			Iodide of iron; free diet.	28	1·027	20		
2	1·033		Peroxide of hydrogen; rigid diet.	67	1·030	28	10	10
			Iodide of iron; free diet.	19	1·029	25		
			Potassio - tartrate of soda; rigid diet.	48	1·029	21	5	5
			Hydro-chlorate of ammonia in the day, and opium at night.	45	1·030	25		
3	1·040		Tincture of the sesqui-chloride of iron and laudanum; free diet.	7	1·040	33		
			Peroxide of hydrogen; rigid diet.	24	1·040	33	6¾	6¾
			No medicine; rigid diet.	4	1·040	35	9	9
			Peroxide of hydrogen; rigid diet.	21	1·040	36	11	11
			No medicine; rigid diet.	28	1·042	42	7	7
			No medicine; rigid diet, and sugar ad libitum.	28	1·041	41		
			Pepsine; free diet.	3	1·040	40	5¼	6½
			Syrup of the iodide of iron; free diet.	41	1·039	38		
4	1·035	13	No medicine; free diet.	13	1·034	13	15	17
			No medicine; a rigid diet of meat, with oatmeal bread,	47	1·027	5	7½	4

The general result of these four cases shows little or no change from the employment of any one of the drugs. The most marked change was in No. 1., when a rigid diet was imposed for thirty-one days, the sugar falling from twenty-three to seventeen grains in the ounce, and the quantity of fluid drank and passed sensibly lessened; and in Case No. 4., during the imposition of a rigid meat diet and oatmeal bread for forty-seven days, the quantity of urine thirteen grains in the ounce fell to five grains, and the quantity of fluid drank and passed from fifteen to seventeen pints, fell respectively to seven and a-half and four pints : a manifest improvement which warrants a further trial of the means.

I much desire that I could send you away with more practical ideas as to the causes, and, consequently, as to the successful treatment, of so serious a disease ; but it would be a betrayal of my trust if I were even to attempt to show that to be *certain*, which is *uncertain*. Let this very *uncertainty*, however, be a stimulus to you rising members of the profession, to pursue, with ardour, the inquiry, remembering that a satisfactory solution may be arrived at, by the union of a certain amount of chemical, physiological, and pathological knowledge, and a careful observance of symptoms at the bedside.

A CLINICAL LECTURE ON

UNILATERAL HERPES.

By JONATHAN HUTCHINSON, F.R.C.S.

GENTLEMEN,—The disease known as Herpes Zoster, or common shingles, possesses features of interest which are peculiar to itself, and which far transcend those referring merely to diagnosis and treatment. It is an instance of an inflammation of the skin pro- · · · duced directly by nervous influence. Although, as I shall have to suggest, there are probably many other forms of inflammation, both of the internal organs and of the surface of the body which are thus produced, yet shingles is by far the best instance that we have. It is, indeed, so characteristic, that it almost constitutes a class of itself. I need not stop to explain that shingles is not a " disease of the skin" in any correct sense. It is a symptom, displayed by the skin, of disturbance beginning at some part of a nerve-trunk, or possibly, in the very centres themselves. The so-called dermatologists have no claim to it whatever.

As an instance, in proof of what the nerves can effect in disturbing the nutrition of the part to which they are supplied, and producing that modification of nutrition known as inflammation, herpes zoster must ever claim a large share of attention from the student of patho-logical causes. It has, however, still other and greater claims on our curiosity and wonder.

The phenomena of herpes zoster are familiar to all. A person begins to feel a certain belt of skin, on one side, tender and painful. He strips, but there is nothing to be seen, the skin is not even red.

Next day, however, or it may in a rather shorter or rather longer time, he finds red points arranged in long oval groups on the painful parts, and very quickly each point shows a small clear vesicle. The vesicles at first are beautifully pellucid, and very often a number are heaped together, not positively confluent, for divisions between them may still be seen, but much in the manner that a number of hills constituting one range are piled together. At a later stage, the vesicles may contain a blood-stained serum, and, later still, opaque pus. You will find the groups on one side of the body only. If the fifth nerve is affected, then on one side of the forehead, if one of the intercostals, then on one side of the chest or abdomen, and so of the two extremities. Commencing from behind at the spinous processes, the groups will arrange themselves in a curved line, passing downwards and forwards on the trunk, and approaching the middle line in front. Now and then a few may transgress the middle line, before or behind, a little, say an inch or so, but scarcely ever more than that. The affected parts continue very painful during the eruption, and often even for a considerable time afterwards, but the patient complains but little of other symptoms. After the eruption has lasted a few days it begins to fade, and in a week or ten days it will have wholly disappeared, leaving, however, possibly some troublesome ulcers. It disappears at a stated time, just as certainly as does measles, and like that exanthem, it leaves the patient free of all liability to another attack. At any rate, second attacks of shingles are as rare as are those of measles. The eruption itself never relapses. You know how almost all skin diseases, except the exanthems, tend to relapse even in spite of treatment. In shingles, however, it matters not what treatment is pursued, you may give your prognosis most confidently, you may assure your patient that it will in a short time disappear, and that it will never return. You may also tell him that there is no risk of giving it to others, for it is neither contagious nor infectious. Lastly, I may just add, that when the inflammation has subsided, the skin remains for some time rather tender, and, after that, numb, and that it presents numerous little scars in proof that the deep tissues of the true skin were involved.

The constitutional disturbance which attends an attack of shingles is rarely more than the pain, &c., will account for, and is generally proportionate to the severity of the eruption. Now and then the patient has a slight rigor before the outbreak, but more usually he

feels quite well. It affects all classes and all ages, both sexes, and either side of the body, without apparent preference. That the eruption follows the course of distribution of certain sensitive nerves, is usually clear at a glance to any anatomist. When it affects the ophthalmic division of the fifth, the groups of vesicles will be limited most accurately to the forehead, upper lid, side of nose, and side of temple. Not a spot will transgress the middle line, either on nose or scalp, and there will not be a single vesicle on the lower eyelid or the cheek. Observe the two portraits which I show you. When the second intercostal is the nerve affected, you will often find vesicles down the inner aspect of the arm along its humeral branch. In a few cases, and especially when the lower part of the body is affected or the upper parts of the thighs, it may not be so easy to specify the particular nerve involved. In reference, however, to these cases we must bear in mind that the nerve-trunks near the spine, interlace in a very complex manner, until it results that the trunks which have received names from the anatomist, may very possibly receive filaments from several different sources.

As regards the extremities, I think we may note that you will but rarely see shingles on the forearm or hand, and never on the lower extremity below the knee.

We are now in a position to state the terms of our riddle, *Is herpes zoster an exanthem or a neurosis ?* If an exanthem, why, then, is it not symmetrical, not attended by constitutional disturbance, not liable to spread by contagion ? If a neurosis, why should it not relapse, why should it have stages, and how can it protect the individual against a second attack ? There is no other neurosis which can be mentioned (neuralgia for instance), which is not very liable to relapse or to return again after cure. My own suspicion is that it belongs to neither of these classes, but that it constitutes a new group by itself, and further, I feel convinced that whoever may succeed in unravelling the mystery which at present surrounds it, must, at the same time, make a discovery in physiology. Such, then, being the interest and importance of this remarkable disease, I shall need no apology for introducing at some length the clinical evidence which I have collected regarding it. We will, if you please, discuss seriatim, the several points on which I have already made assertions.

That herpes zoster may occur at almost any age, and if we except early infancy, is equally frequent at all periods of life.

My own series contains cases in which infants of the ages of $3\frac{1}{2}$, 2 years and 9 months, and 7 months respectively were the patients. In one the subject of it was an old man of 79. (*See Table,* p. 81.)

This statement applies only to herpes zoster of the trunk. In that form which affects the first division of the fifth nerve (*herpes frontalis*), we find a considerable majority of our patients advanced in years. At least, such has been my experience hitherto, but the number is too small for a trustworthy conclusion. In seven cases out of fourteen, the patients were above 60, and in three of the others above 40. *See Table* p. 94.

That the two sexes are equally liable to its attacks.

In my own series the number of males is somewhat greater than that of females (37 to 26.).

That it is not possible to denote any special condition of general health which predisposes to its attacks.

I have carefully inquired, in all cases, on this point, and in a large proportion, have not been able to discover any symptoms, either of humoral or visceral derangement. In many cases of zoster on the thorax, the patients are the subjects of spasmodic asthma, but in many others they are not so. In some cases the patients have been out of health for some time before the disease occurred, but in many others not the slightest previous illness had been observed.

In further proof that general dyscrasia does not predispose to it, the fact that it does not occur in members of the same family may be mentioned. It has never occurred to me to have a patient state that any relative had suffered from similar disease.

Herpes zoster is not contagious.

I have never known even the coincidence of two cases occurring in the same house, and I am not aware that one single instance of such occurrence is on record.

As a general rule herpes zoster does not occur twice in the same individual.

I have myself only one instance in which a patient suffered twice from it. A very few others are on record. In all such the interval between the two attacks has been very long (from 20 to 30 years). Probably these instances of second attacks are not more frequent

relatively to the actual frequency of the several diseases, than are second attacks of any of the exanthems, and they appear to occur under precisely similar circumstances, *i.e.*, with long intervals. In my own case (see Case VI., p. 82) there are two exceptional features, the occurrence twice and the asserted symmetry of the disease in the first attack. Whether it is probable that the diagnosis in the first instance, was incorrect or not, I must leave in some doubt.

In true herpes zoster the eruption is (with the very rarest exceptions) never symmetrical.

I have seen but one case in which the eruption occurred on both sides. In one other case which came under my observation, in a man, the rash was on the right side of his chest, and at the same time on the left frontal region. Several writers on skin-diseases, assert that they have met with symmetrical herpes. There is a rare form of syphilitic rash, so closely similar in all its features to the true zoster, that it is very possible that mistakes may have occurred.

Of this remarkable affection, hitherto undescribed, and which I may call "Syphilitic shingles," I have seen three or four examples. In the last I was able to bring the patient before you. The points of diagnosis are, that the syphilitic form is always symmetrical, seldom limited to the chest, and does not disappear nearly so quickly as the true shingles.

A large majority of writers on skin-diseases have never themselves seen the shingles symmetrical, though most incline to the opinion that it may occasionally be so, and quote instances from the older writers.*

My own case, in which it occurred on the frontal region of one side, and the thoracic of the other, is, I believe, without a parallel on record, and it seems to be so important, that I shall read its details.

Joseph Bond, aged 56, the subject of severe chronic bronchitis and asthma. I had operated on him for the radical cure of hernia

---

* Two physicians, both of them trained observers in skin-diseases, once sent to me a supposed example of symmetrical zoster. Neither of them felt any doubt as to the diagnosis, and detailed notes had been taken for publication. At first sight I was inclined to concur in their opinion, but further examination enabled me to convince both myself and them that the rash was syphilitic. The subsequent progress of the case left not the slightest room for doubt as to its nature. Had this case been recorded, we should have been compelled to admit it as a well-authenticated example of symmetrical herpes zoster.

about two months before, after which he had considerable constitutional disturbance. This, however, had wholly subsided, and he was now in usual health.

On July 17th, he came to me with a commencing half-zone of shingles on the *right* chest, extending from the spinous processes behind to the middle of the sternum, and taking the course of the fourth dorsal nerve. Great pain had preceded the appearance of the eruption. On the following day a similar eruption shewed itself on the *left* forehead. It covered the left upper eyelid, the eyebrow, and extended backwards over the anterior two-thirds of the scalp. The conjunctiva was congested and eye irritable. Both on the chest and the scalp the characters of the rash were subsequently developed in full perfection.

I have no note of his progress later than the seventh day; when the rash was fading.

In a second case I have seen herpes over one scapula and a single group on the back of the arm, whilst, at the same time, a few scattered vesicles were present on the opposite side of the chest, but I am doubtful whether the latter were those of true zoster. Mr. Bryant, of Guy's Hospital, has published a case of symmetrical zoster. The only case which I have myself seen, was that of an old man, kindly sent to me by Dr. Hughlings Jackson.

Herpes zoster occurs with equal frequency on the two sides.

An interesting instance of the fallacy of individual opinions when formed without careful statistical inquiry, may be mentioned in the fact, that Reil says that herpes "always occurs on the *left* side;" and Biett, that "in nineteen cases out of twenty it is on the *right*." The two assertors are almost equally in error.

Sir Thomas Watson, in fifteen cases, found it on the right in ten, and the left in five. Rayer, in fifty-three cases, right, thirty-seven, left, sixteen. Mehlis, of twenty-five cases, right, nine, left, sixteen. The total of these observers gives ninety-three cases, and fifty-six on right side to thirty-seven on the left. In my own experience, I have in sixty-two cases, seen it on the right in thirty-two, and on the left in thirty. We may, therefore, conclude that it manifests no very appreciable preference for one side over the other.

That herpes zoster generally observes closely the recognised anatomical distribution of some nerve.

[For proof of this I must refer to the cases given in the appended Tables, and to Professor Barensprung's paper mentioned at page 77.]

That the nerve affected is usually a cutaneous one, but that this is not invariably nor exclusively the fact.

The chief phenomenon of shingles is the development of a crop of vesicles on the skin, denoting an inflammatory disturbance of nutrition in the part of skin affected.   That this disturbance of nutrition may take place in other and deeper structures, is rendered probable by the circumstances that not very unfrequently its subjects complain much of severe deep-seated pain ; muscular stitches in the side are not uncommon; in some cases, especially on the forehead, the amount of swelling is such as to prove that the subcutaneous cellular tissue is extensively affected.   I have, however, in addition to these facts as presumptive evidence, the great good fortune of being able to produce some positive facts.   The eye (so invaluable to observers of the inflammatory process on account of the transparency of part of its covering) is again the organ which supplies me with the positive evidence referred to.   In the case of a man who came under my care at the Ophthalmic Hospital on account of herpes frontalis, there appeared reason to believe that the whole ophthalmic division of the fifth nerve was implicated, and the nutrition of the eye itself suffered disturbance.   This case is so important that I shall read it in detail.   (See Case I., p. 76).

This case was the first in which I witnessed undoubted iritis, and, I believe, the first on record.   Since then I have seen three or four others, and feel no hesitation in asserting that the inflammation of the iris stands in precisely the same relation to the nerve disturbance as does the eruption in the skin.   Usually the cornea becomes extensively ulcerated (superficially) at the same time as the iritis occurs, but in one instance we had had iritis whilst the cornea remained quite clear.   The iris in these cases will not respond to the influence of atropine.   In severe cases the eye is usually much damaged.

That there is no reason for supposing that herpes zoster can be produced by artificial irritation of nerve-trunks.

In a case, about ten years ago, in which I had occasion to remove a large exostosis from the inner side of the upper part of the humerus, the patient, a little girl, had, about two months afterwards, an eruption of herpes zoster on the arm and forearm.   A

the time I was much inclined to refer it to irritation of the nerve-trunks, as, during the operation, we had been obliged to hold the nerves aside with spatulæ. Subsequent consideration has, however, led me to doubt whether such is really probable. In operations for the removal of cancerous glands, in those for the ligature of arteries, in neurotomy for neuralgia, in certain wounds and contusions, trunks of nerves must frequently be subjected to mechanical irritation, yet there is no proof that zoster ever follows these. A fact of lesser value, but still of some, is found in the circumstances that physiological experimenters, in the lower animals, have never noticed this eruption as a sequence to nerve-irritation.

Can unilateral herpes be produced by internal medication ?

I have repeatedly seen herpes zoster occur in patients, whom I had been treating for other skin-affections by means of arsenic. This has happened so frequently, that I have been inclined to suspect that it was more than a coincidence.

That the disease runs a definite course.

Bateman wrote :—" The shingles commonly follow the regular course of fever, eruption, maturation, and decline, within a limited period like the eruptive fevers, or exanthemata of nosologists." All subsequent observers have confirmed the accuracy of this statement. I have nothing novel to add respecting it, but I wish emphatically to endorse it. No single case has ever come under my notice in which there was any great deviation from the usual course of the eruption. In most instances, for about two or three days, the patient has complained of premonitory symptoms, *i.e.*, slight feverishness and malaise, and more or less severe burning pain in the part about to be affected. Then the eruption comes out, and remains in a characteristic, but changing, state for a week, when steady decline follows. During this week fresh groups of vesicles may often be observed to appear, but not later. The stage of healing may be indefinitely prolonged, its length depending upon the depth of the ulcers. During this stage, however, there is never any relapse—no fresh vesicles ever appear.

Certain other very important questions arise in the investigation of this disease.

Why are the dorsal nerves, and especially the third or fourth dorsal, so much more frequently affected than any others ?

Why does the eruption so frequently occur in manifest connexion with the distribution of certain branches of the first division of the fifth nerve, whilst we have so few instances in which the second or third divisions of the same nerve are similarly affected?

Why are the forearms and the legs so rarely affected?

Does the nerve-irritation, which every one will admit constitutes at any rate one stage in the disease, begin centrally, or at some part of the nerve-trunk external to the centres?

What share has the vaso-motor nerve in the production of the symptoms?

In concluding this lecture, I must, beg you to pardon its fragmentary and inconclusive character. I have brought forward only doubts and difficulties. My end is gained, however, if I have succeeded in convincing any that there is a special mystery enveloping the origin of this disease; that its clinical study offers an almost unworked, and very hopeful field for scientific investigation; and that whoever shall succeed in finding the right clue as to the mode of production of herpes zoster, will, in all probability, make, at the same time, a valuable discovery in physiology.

I leave, for investigation in a future lecture, what we may conveniently call "Symptomatic Herpes," a disease scarcely less interesting than the one we have just discussed. Symptomatic herpes usually occurs on the lips; but it may be seen also on the nose, and sometimes on the cheeks; it is not unfrequent on the prepuce. It is very often symmetrical, though rudely so. It goes through stages exactly like herpes zoster; but it may occur over and over again in the same individual, and it also differs from unilateral herpes, in that it rarely, or never, leaves scars. It may be observed in any illness in which a rigor has occurred (spasm of arteries, epilepsy of arteries), and is, thus, often seen :—1. After introduction of catheters. 2. In erysipelas. 3. In ague. 4. In pneumonia. 5. In fever. 6. Any inflammation of a shut sac, pleura, peritoneum, tunica vaginalis, &c. It is a common occurrence in association with ordinary catarrh. That it too, like Herpes unilateralis, is produced through the agency of the nervous system, there can be no doubt.

APPENDED CASES.

The following cases have appeared to me worthy of record in more detail than I could conveniently give them in the tabular state.

ment. Their features of pecularity are, I think, sufficiently denoted in their narration. Some of them are given, because in describing them, I had paid especial attention to accuracy as to the parts of skin involved.

Two tabular statements are also appended. The first comprises brief facts as to sixty-three cases of unilateral herpes affecting some part of the neck, trunk, or limbs, and the second includes cases in which the ophthalmic division of the fifth nerve was affected. To each of these tables, summaries are added (pp. 93 and 96).

A very elaborate and excellent report on Herpes Zoster, from the pen of Professor Bärensprung, appeared in *Annalen der Charité—Krankenhauses zur Berlin.* Band IX., p. 40. I have read only the abstract of it given in the *British and Foreign Medico-Chirurgical Review,* for January, 1862. In many respects we have pursued similar lines of investigation. In my lecture I have preferred, however, to deal only with my own experience.

CASE I.—*Herpes zoster frontalis of the left side, affecting the whole ophthalmic division of fifth nerve.—Inflammation of the eye.*

George M., aged 63, a stout, florid man, was attending the Ophthalmic Hospital in September, 1861, on account of slight conjunctivitis of three days' duration. He was prescribed for on a Thursday. During the Thursday night he scarcely slept at all on account of severe pain in the scalp. On the Friday, at noon, the left half of the scalp was " all over pimples."

He attended at the Hospital again on the following Monday, and then showed a characteristic rash of herpes zoster. The patches were almost confluent. They covered the whole upper lid, and passed outwards and downwards into the upper part of his whisker, and inwards and downwards over the whole left half of his nose to its tip. On the scalp the eruption involved the whole left half as far back as a line drawn from the back of ears over the vertex. On the nose and the scalp it was limited most exactly by the median line. The lower eyelid was œdematous, but free from vesicles. The cheek was not affected, nor the ear, nor the parotid or the post-aural regions.

He was a healthy man, and said, that he had never had any ill-ness whatever. Tongue clean; appetite bad.

The eruption was very characteristic, but of those who saw it one gentleman called it eczema, and another erysipelas. From the latter it was easily distinguished from its vesicles being in groups with healthy portions of skin intervening, from the former, by the size, confluence, &c., of its vesicles, and by the blood-stained crusts left by those which had burst.

There were no ulcers or patches on the conjunctiva, but that membrane was swollen and œdematous.

November 14*th.*—His left nostril has been throughout a little sore. There are extensive red scars of the eruption on the scalp. His eyelids (left) are still relaxed, and the conjunctiva much congested. The motions of the globe are perfect. He complains much of pain in the affected region of the scalp, but the pain sometimes quite leaves him. He sleeps well on the whole. The globe is slightly prominent. The cornea is superficially opaque in patches. The pupil is irregular, and a thin layer of lymph occupies it.

He complains that his left side of head feels tight as if bound or pressed, though partially numb. Mr. Dixon and I examined him carefully, and it was quite certain that over the whole distribution of the ophthalmic division, he had very much less perfect sensation than on the other side. The other side was normally sensitive; but in the left he often stated that he did not feel the prick of a pin at all.

He has had a severe crop of boils over the brow, and the irritation, both of skin and eye, has only slowly subsided.

The inflammation of the eye seems to have involved, in a slight degree, all the tissues of the globe, cornea conjunctiva, sclerotic and iris.

Case II.—*Ulcerating herpes zoster in a child.—Ilio-hypogastric nerve.*

James P., aged 7, a rather delicate-looking boy, of light complexion, and red hair.

He was admitted on June 6th, with ulcerating herpes zoster of the right gluteo-inguinal region. It had been out more than a fortnight, and had evidently been very severe. It had now ulcerated extensively, and in some parts deeply. The character of the disease, in respect to the form and arrangement of the patches, was well marked, but all vesicles had disappeared. His father stated that he had not

observed any indication of ill-health. The boy had continued to eat, &c., as usual.

Locality of rash.—There are a few spots near the spinous processes, just below crest of ilium. Passing outwards, the spots become much more abundant, and spread over a much wider space. Taking the great trochanter as a centre, the affected area extends upwards to the anterior spine, and downwards for an equal breadth. Still further forwards, a few spots are seen on the belly in front of anterior spine. There is a large cluster in the fold of the groin, and a patch on the pubes. None on the scrotum or penis. The median line is reached in the middle of the pubes, but not crossed.

The boy had, in addition to the herpes, a few scattered spots on various parts of the back. He had also common porrigo in the occiput, and enlarged glands below it.

A fortnight later the ulcerated surfaces had nearly healed, but were still thickly crusted over.

Case III.—*Herpes zoster on the right buttock, and inguino-femoral region.*—(*Ilio-hypogastric nerve.*)

Charles H., aged 12. It begins over the spines, an inch and a-half below crest of ilium behind; curves downwards, and covers the region about the great trochanter an inch and a-half above, and the same below it. A group passes horizontally forwards, on a level with anterior superior spine of ilium, from thence horizontally, over the abdomen, covering the region bounded above by a line straight to median line from anterior superior spine, and below by fold of groin. On the thigh, in front, it extends downwards two inches below fold of groin. None on scrotum, penis, or inside of thigh. The pubic region is covered. The belt of rash is narrower behind than laterally, or in front; it does not extend downwards over the buttock.

Tongue clean; bowels relaxed; brown complexion.

It came out two days ago; he had been relaxed for a day or two before. He has had cough for long.

Case IV.—*Herpes zoster on the scapular region, and on certain parts of the upper extremity, extending to the middle finger.*

A boy, aged 12, under the care of a medical colleague in the

London Hospital.   On the back the eruption begins on the right of the spinous processes of the second and third dorsal vertebræ.

There is a large group over the back of the scapula, some above and some below the spinous process. There is not a single spot on the skin overlying the deltoid, but just below the border of the deltoid, both behind and in front, there are patches of vesicles. These patches on the posterior and under part of the arm do not extend much lower than the middle. There are no patches behind the elbow nor on the back of the forearm, nor on the back of the hand, till we came to the middle finger, where there is a single group behind the distal part of the first phalanx. On the inner side of the arm patches extend over the elbow nearly down to the wrist.

On the sternum, to the right side, are some vesicles over the second intercostal space, and passing outwards in a line from this to the lower border of the great pectoral muscle into the axilla.

CASE V.—*Shingles occurring twice in the same person.   Patient's statement that it was symmetrical in the first attack.*

Isaac W., a tall, florid carman, aged 50, was attending at the Ophthalmic Hospital on account of white atrophy of the optic nerves. One day his wife attended for him and told me that he was laid up with shingles, and added, that he had had it once before. Respecting this statement, I got subsequently the following evidence from the man himself. "Twenty-six years ago, I had the shingles severely, it came round on both sides under my arms, but did not quite meet in the front. There was a space of three or four inches in the middle, in front, not affected. I was attended by Mr. Lloyd and Mr. Bowen of Greenwich, who both said it was shingles, and considered that it was a very unusual case in its going so far round. I was very ill with it; the rash came full out before we knew what it was; it lasted for about three weeks, as far as I can remember." Second attack, November, 1862. The rash came out in a belt under the right arm. When I saw him, two weeks afterwards, its character was still well-marked. It extended (in scabs) from the mid-dorsal region (ninth vertebra), to the middle of chest, three inches below nipple.

TABULAR STATEMENT OF SIXTY-THREE CASES OF UNILATERAL HERPES (ZOSTER).

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
1	Robert Jones. December 19th, 1854. R. B, page 1. Shoemaker.	21	Rheumatic aching; much pain before the rash.	Right side of chest and axilla, and front of right arm.	Second dorsal.	
2	James Clemons. January 17th, 1855. , R. B, Clothes-dealer. Syphilitic 12 years.	32	Sore throat; debility; rigors; no premonitory pain.	Right side, under axilla, from back to sternum, involving nipple.	Third dorsal.	It faded in front first. An acute case with ulceration. He felt much better after the disease than before, but had been taking bark.
3	Michael Brown. Z. 56. April 11th, 1855.	38	Pale, dyspeptic, rigors, great pain.	Left side, mid-sternum to lower angle of scapula.	Fourth dorsal.	It was first seen on the 11th day, and was then, faded in the middle, but moist both in front and in the back.
4	Emily Darrell. Z. 57. April 5th, 1855.	3	Feverishness; urinary irritation; a stout florid girl, but for long subject to cough.	Right side, on back and under axilla, but not in front.	Dorsal.	The eruption was very painful at first; a new patch came out on the back on the 8th day.
5	Susan Eyres.	38	Feverish and ill for a week before, with much pain in the skin; liable to cough and dyspnœa.	Left side, from middle of sternum to back.	Fourth dorsal.	

G

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
6	Jemima Hedges. P. 172. 29th September 1855.	6	A delicate fair complexioned child, of tuberculous diathesis and liable to cough; spasmodic asthma. Feverishness; great pain in the skin.	From the spines of the sacrum, round the buttock to the groin, down the inner side of the thigh to the knee.		The pain preceded the rash three days; on the 8th day the latter was fading.
7	John Gurling, P. 201. 24th October, 1855.	21	Healthy, never liable to shortness of breath, but during the last three days had some pain in chest, and difficulty in breathing.	Right side of chest.	Dorsal.	This man was the subject of hypertrophy of the right mammary gland; it had been so for a year.
8	Rosa Isaacs. O. 109. 19th January, 1856.	15	Headache, constipation, burning pain in the skin for two days.	"Left thigh." No further note.		
9	Cornelius Hurley. O. 205. 12th March, 1856.	2½	A pale, syphilitic child, the subject of whooping cough. Feverish and sick, with much pain; diarrhœa.	Left side, from mid-sternum to back.	Fourth dorsal.	Twelve days afterwards the rash was quite well, and he had greatly improved in general health.
10	Ellen Stark. O. 217. 19th March, 1856.	13	Delicate, fair complexion, some cough.	Right side from front to back, but no patches in the mid-lateral region.	Third dorsal.	An abortive patch on the back of the arm, and this patch never produced vesicles; the spots were all fading on the 8th day.

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
11	Margaret Hinds. O. 250. 5th April, 1855.	52	The subject of ague; the skin had been very painful for one day.	Back of the right elbow, and in patches up the arm.	First or second dorsal.	The rigors had occurred every other day for a week before the appearance of the rash. She had also herpes on both lips.
12	Harriet Hill. N. 20. 15th May, 1855.	10	Fair complexion, delicate. Languor, and rigors.	Right side, front of sternum, and at the back, none on the mid-lateral region,	Dorsal.	The first vesicles showed themselves on the back; on the 8th day the rash was nearly well.
13	Maria Adams. N. 252.	Adult.	The subject of asthma; slight rigors; great pain in the skin.	Right side, from centre of chest under the breast, to the back.	Fifth dorsal.	
14	Sarah Dyer. N 281. 25th Nov., 1855.	57	Severe burning pain for three days before the rash appeared. A thin, dry-fibred, old woman, liable to flatulent dyspepsia.	Left side, from centre of sternum under the arm to dorsal spines; covers the back of the arm to a little below the elbow, when it creeps to the front.	Second dorsal.	Some of the confluent vesicles were as large as eggs; the patient was very ill, and was reported on the 8th day to be unable to attend at the Hospital; it is doubtful whether she recovered.
15	Henry Coombs. N. 334. 10th January, 1856.	71	A healthy old man, not asthmatic, much burning pain.	Right side.	Dorsal.	He was taking arsenic for the cure of chronic lepra at the time the shingles appeared.
16	Caroline Pell. M. 57. 27th February, 1857.	8	A delicate girl, strumous, no premonitory pain.	Right side of neck, and under the ear, extending to middle line of	Cervical.	In front it crossed the middle line for nearly an inch.

G 2

o.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
17	Margaret Ellison. M. 137. 8th May, 1857.	8	Pale and delicate; severe premonitory pain for two days; no cough; no rigors.	Left side, from middle behind, to middle in front. neck, a small patch on the lower part of the cheek, and another on the cheek a little below the nipple.	Fourth dorsal.	
18	Thomas Harman. M. 145. 12th May, 1857.	9	Fair complexion, delicate.	Left side, from mid-line in front, to a little beyond it behind.	Fourth dorsal.	
19	James Peasey. M. 319. 23rd October, 1857.	13	None. Pale, but in good health.	On one side of the neck and on the top of the shoulder.	Cervical.	
20	Richard Ford. M. 324. 27th Nov. 1857.	3½	In good health; no premonitory pain whatever.	Left side.	Third dorsal.	
21	James Burgess. M. 365. 11th December 1857.	19	Liable to cough; under care two months before for orchitis.	Left side of abdomen, below the navel.	Tenth dorsal.	
22	Lazarus Emanuel. L. 20. 23rd February, 1858.	16	The pain began when the rash came out.	Left side, level with umbilicus.	Ninth dorsal.	No constitutional disturbance.

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
23	Eliza Teidemann. L. 80. 16th April, 1858.	8	No premonitory symptoms	Right side, from the upper part of the lumbar region, to the front of the abdomen.	Eleventh or twelfth dorsal.	Behind it crossed an inch to the left of the spines of the vertebræ, in front it did not quite reach the middle line.
24	Ellen Young. L. 110. 14th May, 1858.	18	Phthisical. Burning pain in the skin three days before the rash appeared; rigors, and loss of appetite.	Left side, crossing under the mammæ, from the centre of the back to the centre of the chest.	Fifth dorsal.	
25	William Peck. L. 127. 4th June, 1858.	15	Burning pain for one day before the rash appeared.	Right side, from middle of back to centre of epigastrium.	Fifth dorsal.	
26	Mary Murphy. L. 188. August, 1858.	7 m.		Side of chest.		No further note as to this case; I did not see it myself, but it occurred amongst my patients at the Hospital on a day when I was from home.
27	Maria Isaacs. L. 236. 10th Sept., 1858.	58	Stout and healthy. Several days severe pain before the rash appeared.	Right side.	Fourth dorsal.	
28	Sophia Davis. L. 264. 1st October, 1858.	15	In good health, but suffering from gonorrhœa; no premonitory pain.	Left side on level with nipple.	Third dorsal.	

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
29	Anne Nevill. L. 310. 5th November, 1858.	16	In good health; burning pain two days before the rash came out.	Right side of neck, in large patches covering the whole side of the neck, and extending upwards to the lower border of the cheek, and to the ear.	Cervical.	It crossed the middle line in front for about an inch, but not at all behind.
30	John Burt. L. 379. 14th January, 1859.	15	In good health.	Along the crest of the left ilium.	Twelfth dorsal.	
31	James Bond. L. 193 and 211. 17th July, 1859.	56	Subject to asthma, and chronic bronchitis.	Right side.	Fourth dorsal.	A few days afterwards this man had shingles affecting the *left* frontal nerve. See frontal nerve series.
32	Samuel Spooner.	17	A pale lad, without cough: no premonitory pain. He had had a sore throat.	Right side, from middle of back, to under the axilla, but not extending in front.	Third dorsal.	The rash was acute and copious but never extended on the front part of the chest.
33	Alfred Crosher. K. 22. 7th October, 1859.	79	A pale cachectic man, with furred tongue.	Two patches a little to the left of the umbilicus.	Dorsal.	He complained of pain over the the ribs of the same side.
34	Jane Goldfinch. K. 97. 13th December, 1859.	17	Has some cough and has had enlarged glands for years.	It extended from the middle line behind the head, behind the ear,	Cervical nerves (superficial).	The statement as to its passing behind the head is her own, the hair is so thick that it

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
				over the lower half of masseter, then along the jaw, and down the neck to sterno-clavicular articulation.		cannot be seen.
35	Jane Siddons. K. 207. 27th March, 1860.	11	In good health and complains of no pain.	Right side, passing from spines of vertebræ under the axilla, then on the anterior fold of axilla; there is a group on the outer side of arm just below insertion of the deltoid.	Second dorsal.	The vesicles when pricked yield plenty of fluid.
36	Elizabeth Wills. K. 363. 14th August, 1860.	39	Has had some wheezing and cough for a month, otherwise in good health. Black hair and dark complexion.	Left side, it began at the root of the hair, passing over the side of the neck, on to the front of chest just below clavicle.	Cervical.	She had no pain before the rash came out; it did not pass the middle line.
37	Henry Burgess. I. 43. 18th Sept., 1860.	28		It began on the neck at the root of the hair.		He says the rash began with watery points, and was preceded by a cold.
38	Hermon Isaacs. I. 90. 22nd October, 1860.	13	A healthy florid boy; he had a pricking pain a day or two before the rash came out.	Left side; it began to come out at the navel and extended to the middle of the back.	Tenth dorsal.	

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
39	Sarah Windle. I. 162. 7th December, 1860.	20	Brown complexion, pale; suffers much from bilious complaints. A severe headache and retching preceded the rash.	Right side, it extended from middle of spine to middle of axillary region.	Fourth dorsal.	Vesicles copious, much pain, preventing sleep.
40	Benjamin Noah. I. 164. 10th December, 1860.	79	A thin old man, tongue nearly clean; much cough. Much pain preceded the rash.	Left side; it began in the middle line behind, and extends to the middle line in front over the pomum Adami; it passes to the top of the ear, and on the face on a level with the top of the ear, but does not extend further forward than the middle of the cheek.	Cervical plexus.	He was under me a year or two ago for piles.
41	Henry Bigden. I. 181. 8th January, 1861.	15	Has generally good health; tongue clean and very red in the centre; so good as usual. Had pains in shoulder nearly a week before the rash came out.	From the last cervical vertebra over supra-spinous fossa; it then crosses the arm an inch above insertion of deltoid, and is continued upwards to the sterno-clavicular articulation.	Cervical plexus.	

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
42	Ann Cassidy. I. 235. 12th February, 1861.	21	Looks healthy, but has had cough for one or two years. Had great pain before the rash came out.	Right side; it begins at the back, passing over scapula, below level of spine, then under axilla, and on to the sternum, it goes a very little way down the arm behind.	Third dorsal.	
43	Robert Cock. I. 270. 12th March, 1861.	69	A thin cachectic man; has winter cough. "A dreadful, fiery, jobbing pain," in the side preceded the rash.	It extends horizontally from the umbilicus to the spine.	Ninth dorsal.	Has continued at work until within the last few weeks, when he has been laid up with short breath.
44	William Harding. I. 276. 26th April, 1861.	14	Brown complexion, florid, rather thin; in good health.	Left side; it extends from edge of axilla forwards to middle of sternum ; not backwards, but five inches lower down is an isolated group, close to the last dorsal vertebra.	Fourth and Eleventh dorsal.	He has been for some months under treatment for psoriasis, for which he has taken arsenic.
45	Jonathan Budgett. I. 349. 6th May, 1861.	62	General health not good. Has had pain on both sides. '	Right side; lower part of dorsal region.	Dorsal.	

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
46	George Graves. H. 10. 3rd September, 1861.	11	A florid, fair complexioned boy.	Right side; commencing between the fifth and sixth dorsal vertebræ, it passed over dorsum of scapula a little above its spine to the posterior wall of the axilla, then down inner side of arm to three inches above the elbow: over the lower half of great pectoral muscle, to middle line of chest.	Second and third dorsal.	There were no patches on the front of the shoulder, nor on the deltoid.
47	Thomas Payne. H. 17. 10th October, 1861.	38	Healthy; dark complexion. He had much burning pain before the eruption showed itself.	Left side; the belt extends forwards from a little to the right of the spinous process of the last lumbar vertebra, to near the anterior spine of ilium, but rather above it.	Lumbar.	This man has been under my care for eczema, for which he has been taking arsenic for many weeks.
48	Edward Howard. H. 25. 24th October, 1861.	39	A cachectic man, almost bald.	Near the second dorsal vertebra and down the inside of the arm nearly to the elbow.	Second dorsal.	He had chancres three years ago; there is a papular syphilitic rash on his forehead.

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
49	Sarah Nagg. H. 44. 1st October, 1861.	22	No note.	Right side; extending forwards, on level with first lumbar vertebra.	Twelfth dorsal.	It is fully out in front, but on her back there is only a red patch, the vesicles not being formed.
50	H. Argent. H. 56. 14th January, 1862.	62	Pale, but healthy.	Left side; it begins a little above the crest of the ilium, and extends forwards to navel.	Twelfth dorsal.	Vesicles copious.
51	Benjamin Taylor. H. 59. 17th February, 1862.	20	Healthy, excepting head-ache at times.	Right side; no further note.		
52	Sophia Ives. H. 60. 18th February, 1862.	61	A pale woman. She has had for some weeks pain in her left arm; about three days before the rash came out, she began to suffer severe pain about the iliac crest, and in front of joint; the pain was intolerable.	It began over the middle of the sacrum, about two inches below the iliac crest, curving in a belt round the buttock to front of thigh, both sides of which it covers; it ends just above the knee.	Anterior crural (lumbar plexus)	The posterior part of buttock and thigh are wholly free; the patches of vesicles are very numerous, and are surrounded by much copper-tinted congestion of skin.
53	Martha Heard. H. 60. 4th March, 1862.	12	In good health.	It commences on the cheek just over the second lower molar tooth, dipping downwards and forwards	A branch from the third division of the fifth.	

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
54	Mr. P. 1851.	45	Good health, with the exception of liability to asthma.	under the jaw to the middle line, a little behind the chin ; a second patch in centre of chin. Right side from mid-spine to mid-sternum below nipple.	Fourth dorsal.	A very severe case attended by intense pain.
55	Miss S. February, 1863.	15	Healthy.	Left side ; it crossed the spines of the vertebræ a little to right side.	Fourth dorsal.	
56	Isaac Waters. A Carman. 1862.	46	Healthy : the subject of amaurosis from white atrophy of optic nerves.	Under right arm from back to mid-sternum.	Fourth dorsal.	In this case the man stated that he had had it before, and symmetrically, 26 years ago, but in this he may, perhaps, have been mistaken.
57	Marian Chamberlin. July, 1862.	9		Left side ; from last dorsal interspace to the umbilicus; a narrow belt.	Eleventh dorsal.	Very well-marked, but a mild case.
58	An adult man. 1862. Metropolitan Free Hospital.	Adult.	No note.	Third dorsal interspace of *right* side above and below spine of scapula; a single small patch above and behind ext. condyle of humerus.	Third dorsal.	In this case there were a few scattered vesicles resembling herpes, but not conclusively characteristic on the *left side* of chest.

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
59	Charles Hinchard.	12		Right buttock and inguino-femoral region.	The hypogastric branch of lumbar plexus(first lumbar).	
60	James Pucil.	7		Right buttock and inguino-femoral region.	The same.	
61	A boy in London Hospital.	12	In good health.	Scapula; arm, forearm, and middle finger, right.	First dorsal.	In this case some vesicles occurred as low as the middle finger.
62	James Appleby. Metropolitan Free Hospital.	12		Left sacrum, buttock and inner part of thigh.		
63	Patrick O'Donnell. Metropolitan Free Hospital.	19	Very feeble.	To right of umbilicus.		

SUMMARY OF THE SERIES.

The average age was twenty-six years. Thirty-seven of the patients were males, and twenty-six females.

In one case, a branch of the third division of the fifth nerve was the one affected. In eight cases the nerve affected was one of the cervical; in forty-eight, one of the dorsal; and in five, one of the lumbar. In no single instance was the eruption on a part supplied by any of the sacral nerves.

The cases in which the first division of the fifth was involved,—"Herpes Ophthalmicus,"—I have arranged in a second table. In this latter, I have comprised a few cases recorded by other authors, but of the series above given, all the patients were under my own care.

TABULAR STATEMENT OF FOURTEEN CASES OF HERPES FRONTALIS seu OPHTHALMICUS.

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
1	George Morgan. The Ophthalmic Hospital. September 9th, 1861.	63	Florid; nearly bald.	Left forehead, upper eye-lid, iris, side of nose to the tip.	Ophthalmic division of fifth nerve.	The eye inflamed and was practically lost.
2	Mrs. Kimpton. Metropolitan Free Hospital. December 17th, 1861.	26	Very pale and feeble.	Left frontal region, and mid-region of side of nose.	Frontal and infra - trochlear branches.	Eye not inflamed.
3	William Woolgar. March 29th, 1862.	3½	In usual health.	Right forehead, and mid-region of side of nose.	Frontal and infra - trochlear branches.	A portrait of this boy is published in the New Sydenham Society's *Atlas of Skin Diseases.* Eye not inflamed.
4	Joseph Bond. July, 1859. L. 211.	56	Subject to bronchitis.	Left forehead,	Frontal division	He had also shingles of the right side of chest at the same time. Eye not inflamed.
5	A. B. A clerk.	25	In good health; ten days' premonitory pain (severe).	Left forehead.	Frontal division only.	Eye not inflamed.
6	Mrs. Barnes. The Ophthalmic Hospital.	64	Pale and thin, but in good health. Severe headache preceded the	Right forehead, no vesicles on side of nose.	Frontal division only.	This was not a very severe case. The eye was not affected at the date of my notes, but I have

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c., &c.	Part Affected.	Nerve Affected.	Remarks.
	June 9th, 1863.		herpes, but was not confined to the forehead.			no record of subsequent progress.
7	Rayer's case. A man.	47		Left forehead, and side of scalp (none on face).	Frontal division	
8	Miss B., of Luton, Bedfordshire.	68	A spare but healthy lady.	Left forehead, side of nose, cornea conjunctiva, and iris.	Frontal, trochlear, nasal ciliary branches, &c.	This patient came to me a month after the attack, on account of the damage to the eye. From her account the attack had been very severe, the cornea was externally opaque, and she has since suffered from chronic glaucoma.
9	Mrs. M., Hertford.	66	A lady in rather feeble health, and with suspected renal disease.	Forehead, side of nose, conjunctiva, cornea, and iris.	Frontal, trochlear, nasal ciliary branches.	As in the preceding case this lady came after the attack on account of the state of her eyes. The cornea was hazy, the pupil fixed, and the skin numb.
10	Mr. —— of Hackney. Sent to me by Dr. King, of Hackney	60	A very healthy man.		Frontal, trochlear and nasal branches.	This gentleman was sent to me by Dr. King on account of commencing cataracts. I found one side of forehead and side of nose deeply pitted by herpes, and he gave me a history of a severe attack.

No.	Name, Date, Reference.	Age.	Health, Premonitory Symptoms, &c.	Part Affected,	Nerve Affected.	Remarks.
11	Dr. Markham's case.	46 ?		Left forehead and side of scalp.	Frontal. The eye fortunately did not inflame. Frontal.	This accomplished physician was himself the patient. See *British Medical Journal,* 1866.
12	Portrait published in Danielsen and Boeck's *Atlas of Skin Diseases.* Tab. IV.	65 ?	A healthy man.	Right forehead and side of scalp.	Frontal.	
13	John Anderson, Ophthalmic Hospital, June, 1866.	69	A tailor, in good health. Had pain in the part, and also a slight rigor the day before the eruption came out.	Left forehead and side of nose, iris, cornea, &c.	Frontal, tro-chlear, nasal and ciliary branches	The cornea was left with extensive opacities, and the iris was adherent at the pupillary edge. Throughout the whole attack the pupil could not be made to act with atropine.
14	A girl under Dr. Parker's care in the London Hospital, 1864.	16 ?		Left forehead, side of nose and iris : but little general congestion of eyeball.	Frontal, troch-lear, nasal and ciliary branches	Dr. Woodman was kind enough to show me this case. I am sorry to say that not having kept notes, I am obliged to give its details from memory.

SUMMARY OF THE SERIES.

The average age in the above fourteen cases was 50 years. Nine were males and five females. The right side was affected in three cases, the left in nine. In all the tract supplied by the frontal nerve (forehead and front part of scalp) was affected ; in seven of the nose also ; in five of the latter the cornea and iris inflamed. In none of the cases in which the frontal nerve *only* was involved did the eye inflame, whilst it suffered in all in which the nasal branch was implicated (as shewn by eruption on the end of the nose). In two in which the trochlear branches were implicated, without the nasal, the eye did not inflame. This group of cases will be treated in more detail in the *Journal of the Ophthalmic Hospital,* for September, 1866.

THREE CLINICAL LECTURES

Delivered during the Session, 1865-66.

By C. F. MAUNDER, F.R.C.S.

LECTURE I.

Organic stricture; retention and extravasation of urine; bowels obstructed by distended bladder.

GENTLEMEN,—I purpose to day to draw your attention to a case of complicated stricture of the male urethra, which is now in the Hospital, and with which many of you are acquainted. I think I shall best fulfil what is intended by the term *clinical* if I adhere pretty closely to my text (the case itself), and endeavour to explain in words to you the train of thought which arose on my hearing the patient's history of his malady, on seeing his actual condition, and after a physical examination instituted by myself. Thus, by a careful analysis of the history and symptoms, a diagnosis was made and treatment adopted, for reasons which I shall explain.

I will read an account of the case up to to-day, reported by Mr. Horder.

G. B., aged 51, was admitted into Glo'ster Ward, November 13th, 1865, suffering from almost complete retention of urine. The patient's history of the case is as follows. He has had a stricture of the urethra three years, during which time he has not required any surgical interference. Has had gonorrhœa, but how long before the appearance of stricture, cannot be distinctly ascertained. On Friday, the 10th November, he found he could not pass water as usual; he therefore sought the advice of a medical man who prescribed for him : next morning he was able, on rising, to pass a small

H

quantity of urine. On the same day (Saturday), while trucking some bales of jute in the London Docks, he felt something give way in his inside. He became faint, and was unable to continue his employment, and presently, though he felt easier, the scrotum began to swell. He was walking about the rest of Saturday, and on the following day also. On Monday he sought admission into the Hospital, and his condition was as follows : bladder distended, reaching as high as the umbilicus, painful on pressure ; penis swollen, red and œdematous ; scrotum very much distended, of a dusky-red appearance, and exceedingly painful ; no fluctuation could be detected in the perinæum. The patient had an anxious look, a brown tongue, and a quick pulse. The house-surgeon tried to pass catheters of various sizes, but failed to get the smallest into the bladder. Mr. Maunder saw him in the afternoon and laid open the scrotum by free incisions, a considerable quantity of urine passing from the incisions. A linseed-meal poultice to be applied, and he is to take two grains of opium at once, and two ounces of house-medicine in four hours' time. Milk and beef-tea diet, and four ounces of brandy.

14*th*.—He feels much easier. A considerable quantity of urine passed from the wounds during the night ; bowels unopened ; tongue brown. To have a simple enema and eight ounces of brandy.

15*th*.—To-day, the right groin above Poupart's ligament being more red and tender was incised, and urine and pus evacuated. Bowels still confined. Ordered, five grains of calomel at bedtime, and two ounces of house-medicine in the morning, if necessary.

16*th*. Bowels still confined. The house-surgeon ordered half an ounce of castor-oil directly, to be repeated if necessary. Mr. Maunder saw him in the afternoon and passed a No. 5 catheter. It was tied into the bladder, but accidentally slipped out during the night. Hiccup troubles him.

17*th*.—Feels much easier. Bowels were very freely opened soon after the bladder was emptied. Pulse very fair.

18*th*.—Altogether better ; moderate quantity of urine flows per urethram.

I was introduced to the patient by the house-surgeon, who informed me that he had attempted to pass a catheter, but had failed.

to do so. On turning down the clothes, the patient being on his back, the abdomen appeared to be somewhat distended below the umbilicus; the integument, to a less extent, was reddened, œdematous and tender on pressure; the right inguinal region, above Poupart's ligament, being especially swollen and sensitive to touch. On percussion over the abdomen resonance was elicited, except over the hypogastric region where there was marked dulness, and the hand could detect a circumscribed swelling in this region, though the attempt to define this gave pain, and was not persisted in. The attempt to obtain fluctuation by palpation was not made on that account also. The scrotum—this organ was much swollen, dusky red, with a patch of gangrene at its most dependent part; the perinæum—this region was unusually sound towards the anus, but its tissues were indurated and agglutinated just behind the root of the scrotum. The water-bottle was being used as a little urine was dribbling from the urethra.

The first question that occurred to one's mind to answer was, what is the cause of this inflammatory condition of the scrotum, is it simple inflammatory œdema associated accidentally with retention of urine, or is the swelling and redness due to extravasation of urine? In the first place, this condition of the perinæum, scrotum and abdomen is commonly met with in cases of extravasation, while simple inflammatory œdema is rarely seen; and secondly, a simple or erysipelatous inflammation is not of necessity limited by the attachments of the deep fascia, while this latter membrane determines the direction of an extravasation. Thus, aided by the history, a diagnosis was soon made. Extravasation then having occurred, it was very desirable to afford an outlet to the urine so situated as quickly as possible, for if this be neglected the most acute inflammation, with sloughing of areolar tissue and large tracts of skin soon results, speedily associated with irritative fever, typhoid symptoms and death. I at once, therefore, incised the scrotum freely on either side of the raphè, and a good quantity of urine gushed out, the incisions being commenced at the root of the scrotum and carried forward through the most depending and sloughy part, so as to favour the rapid filtration of the extravasated fluid and prevent bagging posteriorly. The scrotum began at once to collapse, and I ordered a hip-bath and poultice as soon as bleeding had ceased; two grains of opium at once, and a dose

of house-medicine four hours after; good diet; brandy. Why does the scrotum slough quickly in these cases? Probably from two causes; one, by reason of the excessive inflammation caused by the presence of a highly irritating fluid; the other, an insufficient supply of blood to maintain the life of the tissues, induced by the presence of this urine and inflammatory deposit obstructing the blood-vessels by mechanical pressure, for in this organ there is no cellular tissue to form a bed and protection for the vessels to lie in.

I must now leave the consideration of the case for a moment in order to explain the principles upon which the above treatment was employed, and in doing so, must refer to the pathological changes which occur in stricture leading to the condition in which we found our patient. Some part of the urethra, generally the spongy portion near the bulb, becomes the seat of chronic inflammation, attended by a deposit which gradually encroaches upon the canal and narrows it. This process may extend over a period of many years, the stream of urine becoming slowly smaller than normal and the patient finding it necessary to strain in order to accomplish micturition. Now this straining to force the urine through the narrowed channel leads to a dilatation of that portion of the urethra behind the obstacle, and in severe cases the sphincter vesicæ even, by reason of the stretching to which it has been subjected by the straining to make water in order to overcome the obstacle, is no longer able to close the orifice of the bladder, and an involuntary dribbling results. But short of this dribbling, a great evil may result. As a consequence of constant pressure upon the urethra behind the stricture this part becomes dilated, and thus allowing a drop or two of urine to rest here after each act of micturition, the mucous lining becomes inflamed, and a small abscess forms in the perinæum (or just behind the stricture wherever that may be), and probably communicates sooner or later by " progressive absorption," with the urethra. Now, supposing this abscess to exist with a very tight stricture in front of it, and the patient suddenly to find that he cannot pass water at all, the condition of retention is established. Now this retention is believed to be due either to temporary spasm of the muscular wall of the urethra, or to an accession of inflammation, or perhaps to a plug of mucus obstructing the narrow channel, but whatever the cause, if it persist sufficiently long, will lead to the condition in which we find the patient now under treatment. Finding

that he cannot micturate, the patient strains violently with the hope of relieving himself, and in so doing, all the muscular power that can be brought to bear upon the bladder is called into requisition, and the weakest part of the urinary passages yields to this force if the stricture does not give way. Now the weak point is the urethra immediately behind the stricture, and supposing a communication to exist between the circumscribed perinæal abscess, to which I have alluded, and the urethra, the only obstacle to extravasation is the abscess wall. This, unable to resist the straining efforts of the patient forcing the urine upon it, gives way at some point, and extravasation is established, and a condition, such as we have witnessed, results.

To revert to the patient. In a case of retention the most satisfactory mode of evacuating the bladder is by the urethra with a catheter and you will perhaps ask why I did not attempt to introduce one; and perhaps also it has not occurred to you that I have already established a communication between the external world and the bladder : but a little reflection will show you that I have done so. In the first place, water dribbled from the *meatus urinarius*, showing that the stricture was not impermeable and that retention was not absolute, and it was therefore possible, provided the *detrusor urinæ* were not paralyzed by over-distension, that nature was equal to the emergency. But, let us suppose that the stricture had been at the time impermeable, the incisions into the scrotum at once established an indirect communication through the cellular tissue of the part with the opening in the urethra behind the stricture and thence directly with the bladder. Bearing that fact in mind, I was satisfied to await the result of the above treatment as long as no untoward symptoms called for further surgical interference. Another reason for not meddling with the urethra was this, the adjacent soft parts were infiltrated with urine and with inflammatory effusion, and these would, of course, tend to narrow the urinary passage still more, but by waiting some hours and giving time for these effusions to subside and for the use of remedies the chances were in favour of any existing spasm becoming relaxed and that temporary pressure on the urethra would be removed. The comparative ease with which a catheter was passed on Thursday, or about seventy hours after the incisions had been made, is a good argument in favour of the line of practice adopted.

The fact to be remembered, and upon which the mode of treatment hinges, in a case of extravasation with retention is this—that literally the physical condition understood by the term retention, as applied to the bladder, no longer exists, inasmuch as the urine can flow out into the areolar tissue of certain regions. By free incisions into the infiltrated tissue, and especially the perinæum if involved, or as near to the opening into the urethra as circumstances will permit, retention, so called, is relieved, and the catheter may with advantage be dispensed with for a time. Having done so much, we found on the following day that urine had freely escaped through the incisions, but the swelling and redness had increased in degree but not in extent over the abdominal wall.   To relieve this state of inflammation caused, doubtless, by the presence of urine, an incision was made in the groin above Poupart's ligament down to the aponeurosis of the external oblique muscle;—mind, the incision must include the deep fascia, because under this, the source of irritation, the urine, will be found for reasons already explained.   Still, although a fair quantity of urine flowed by the urethra, the hypogastric tumour was only slightly diminished in size, but as this symptom was not urgent, I left the case to time and a repetition of the aperient and hip-bath for the second day.   On the third day (Wednesday), the bowels being still unopened, I ordered five grains of calomel, and a repetition of the house-medicine, but without the desired effect.   On the fourth day (Thursday) the hypogastric tumour remained and hiccup had supervened, and I now thought the time had arrived for further surgical interference.   I presumed that constipation was caused by pressure upon the rectum of the distended bladder, and that the indication was, therefore, to empty the bladder thoroughly by some means or other.   How was this to be effected?   Common-sense, and a good surgical rule replied—by the urethra, if possible, and I do not hesitate to say, knowing that the urethra had had seventy hours of rest and means had been employed to dispose of the swelling around, that I had great hopes that I should succeed in introducing a catheter.   As you saw, I made the attempt first with elastic catheters, but failed; then with a No. 4 metallic instrument, and succeeded in reaching the bladder with tolerable facility and in drawing off two pints of urine, slightly tinged with blood,

tolerably clear and only slightly ammoniacal. I tied the catheter in to prevent refilling of the viscus. As regards the substance of size of a catheter, I may say in every case of supposed stricture of the degree of which you are ignorant, no matter whether you select a soft or a metal instrument, begin with either No. 7 or 8, if neither of these will pass, you may be sure of the nature of the case, and have only to descend the scale until you find that which will effect your object. But, especially where others have stepped in before you and have drawn blood, and you still deem it right to try catheterism, always select a large instrument because it is just possible that Fortune may favour you. The previous escape of blood may have opened up the stricture, and your large instrument gliding over the existing lacerations, may pass the stricture and relieve the patient. Then again, as to the instrument, is it to be soft or hard? In the majority of cases of stricture I use the soft, because less mischief is done with it, and when well softened it readily traverses a tortuous canal; but in the case before us our grand object was to get into the bladder by the urethra if possible, and not to give up the attempt without an effort. I, therefore, gave the preference as you are aware (commencing with the soft in deference to the suggestion of a senior colleague) to a metallic instrument. Now it was of vital importance to empty the bladder, and I determined in this instance to act apparently contrary to my custom in the treatment of stricture, and to use some force, if need be, in order to traverse the obstruction, rather than without it to resort to some other and more severe operative procedure. The term *force* is a dangerous one to use in reference to stricture, perhaps *steady pressure* better conveys my meaning, exercised in the direction of the urethra, and if the end of the instrument has entered the track of the stricture little mischief will be done by a careful operator. Then again the curve, if one will not pass, try a different one, both larger and smaller.

Fourth Day.—The bowels were freely moved soon after the bladder was emptied, proving the correctness of the opinion that constipation was due to the pressure of that distended viscus upon the rectum.

Fifth Day.—The catheter slipped out of the bladder and the

urine was re-accumulating probably on account of the weakened condition or exhausted irritability of its muscular coat by prolonged distension. But you will probably ask, supposing I had been unable to pass a catheter, what I should have done to empty the bladder. Two methods of operation were open to me to choose from, either tapping per rectum or a free incision into the perinæum with the hope of laying open the urethra behind the stricture. I should have selected tapping per rectum, because by this method I was sure of emptying the bladder completely and at once, whereas, had I simply laid open the urethra in the perinæum, or rather attempted to do so, for I could not be sure of success without a guide, and no director could be introduced, the urine very probably would not have escaped more readily than it was doing by reason of the inability of the *detrusor urinæ* to contract upon the distended bladder, and I should probably have been obliged to resort to tapping after all. In this case, the urine, which did dribble away, was simply the overflow, that is to say, the bladder becoming distended beyond a certain extent the neck was stretched and the mouth opened, favouring the escape of a certain quantity, quite independently of the will of the patient. From observation of this case up to the present time, certain practical deductions may be made.

1. That a bladder shall be greatly distended, and yet a fair quantity of urine shall be passed daily without emptying that viscus— *overflow* not *incontinence*.

2. That in retention with extravasation, free incisions are absolutely necessary, while catheterism may be deferred with advantage.

3. That constipation may be caused by a distended bladder.

Sequel to Case.—From the date of the above lecture to the beginning of March, 1866, the patient passed slowly from a state of danger to comparative good health. The scrotum sloughed to a considerable extent, especially on the right of the raphè, completely laying bare the testicle of the same side. When granulation had set in I attempted to cover the testis by bringing the edges of the wound together anteriorly, and maintained them so by means of sutures, leaving an aperture posteriorly for the escape of urine, The sutures, however, soon gave way, and the wound gaped as

before.   Slowly, the wound closed over the testicle, which ascended towards the external ring, and when the man became an out-patient a small fistulous aperture, through which a very little urine flowed on micturition, alone remained.

June 8th.—The fistula has been closed some time, and the stricture allows a No. 5 catheter to pass into the bladder. On examining the perinæum, a depressed cicatrix leads to the suspicion that the opening into the urethra which preceded the extravasation is closed by the cicatrised integuments.   The patient will remain under care for some time longer, and will be taught to pass a catheter for himself periodically.

Retention of urine ; puncture per rectum.

GENTLEMEN,—By the courtesy of Mr. Curling, I have lately had a number of interesting cases of disease of the urinary organs under my care. A few weeks ago I made some observations upon a case of retention of urine with extravasation, and to-day I shall allude to three instances of a similar class of disease (complicated stricture). I will take them in the order of their simplicity.

CASE I.—B. H., aged 47, was the subject of gonorrhœa thirty years ago. During the last eighteen months the stream of urine has gradually become smaller and smaller, and during the last fortnight there has been a gradual accumulation of urine, and to-day, on admission, February 3rd, 1866, the bladder is as high as the umbilicus and a small quantity only of urine passes. The house-surgeon ordered a drop of croton-oil, and a hot bath after the catheter had failed.

February 4th.—The bowels acted freely, and the bladder is rather less distended. To take two grains of opium at once.

5th.—Hypogastric tumour much as yesterday ; the urine is ammoniacal and a fair quantity is passed.

6th.—The bladder is more distended than ever ; the urine passed is highly ammoniacal, and deposits mucus ; tongue dry and brown, with thirst ; skin hot and dry ; pulse quick and weak ; a catheter cannot be passed ; the bladder is tapped per rectum.

7th.—The patient expresses himself as being very well indeed compared with yesterday ; the tongue has cleaned, and the character of the skin and pulse is totally changed for the better.

8th.—The urine flowing through the canula is highly tinged with blood.

10th.—The urine has acquired its normal colour. There is a slight blush of erysipelas about the left face, consequent the patient

thinks on his having scratched off the head of a pimple existing on the temple. Warm fomentation. Tinct. Ferri Sesqui-chl. ʒss. ter die. Brandy ʒvj.

17*th*.—The erysipelas spread over the upper part of the entire face leading to abscess of the left upper eyelid, but the patient is convalescent. No urine has flowed per urethram, now eleven days since the operation.

The first point that strikes you on reviewing the history of this case is the length of time (thirty years) which has elapsed since the attack of gonorrhœa, which is supposed to have originated the existing stricture. Now the diversity as regards time which is observed in patients the subject of stricture subsequent to gonorrhœa, depends greatly, no doubt, on the mode of life of the individual; the healthy, and careful, and regular liver escaping the after-effects of gonorrhœa much more surely or, at any rate, for a longer period than the careless and irregular liver. The state of the urine in a person susceptible of stricture is a matter of great importance, and if by any excesses or exposure the functions of the digestive organs be deranged, or the excretive power of the skin be checked, this secretion becomes altered in character, a source of irritation to the diseased urethra, and, in time, marked stricture results. Here the urine had been accumulating a fortnight at least, a state due probably both to the severity of the organic obstruction, and, as the distension of the bladder continued, to a corresponding loss of contractile power in the muscular coat of that viscus. Even on the day of operation absolute retention did not exist; why then was an operation performed? The constitution was showing signs of sympathy and suffering from the local malady, and the urine passed indicated the effect upon the bladder of certain chemical changes which if allowed to continue, would lead to a fatal result. How was the retention to be relieved? In all cases of retention the grand desideratum, no matter what operation be resorted to, is to open the urinary track behind the obstacle to micturition, and in this instance the use of the catheter informed us that the obstruction was in the spongy portion of the urethra, and consequently various methods of operation were open to us. By the time that operative interference be-

comes necessary the patient's vital powers, or powers of resisting the
effects of an operation, superimposed upon his then condition, are
diminished in a great measure, and it may be absolutely necessary to
select a method which, while it affords immediate relief, may in the
estimation of some surgeons, be less advantageous to the future
treatment. In the case before us puncture of the bladder was re-
sorted to, not only for the sake of giving instant relief, but also
because I believe it to be the best under such local circumstances,
by such circumstances I mean, retention consequent on organic
stricture, without either perinæal abscess or extravasation.* The
salutary effect of the operation was quickly made manifest, as is
recorded in the history. But there are two other recognised modes
of operation, either of which I might have selected—puncture above
or through the symphysis pubis, or perinæal section, without a
director. Of these the former is nearly allied to puncture per
rectum, but is less advantageous, because the urine must flow contrary
to the attraction of gravitation, and unless great care be observed at
the outset, the areolar tissue, between the bladder and symphysis pubis
will become infiltrated with urine. Still, it must be borne in mind
that the instrument in the majority of cases is only to be worn a few
days, but were it otherwise the suprapubic operation would probably
be preferred. The latter, which consists in plunging a knife into
the perinæum with the intention of opening the urethra behind the
stricture, and so relieving retention, and then carrying it from behind
forwards along the raphè with the hope of cutting through the
indurated tissues and opening up the narrow channel, in no way
commends itself to me. If successfully performed, benefit both
present and future is secured, because a catheter can be at once
passed into the bladder, but success is so remote, that the urgency of
the case and the extra risk which such a cutting operation entails,
scarcely justify its employment. The object of the operation,
whether it be performed above the pubis or per rectum, is two-fold ;
first, to relieve retention, and secondly, by retaining the canula in the
bladder, to insure the escape of urine from that viscus as fast as it
is poured into it, and thus to relieve the urethra of the exercise of
its function, as a conduit, for a time, and so to allow existing in-
flammation and its products to subside and be absorbed. Thus far,

* For treatment in case of extravasation, see p. 99.

then, the case has progressed tolerably favourably, with the exception of an unusual quantity of blood passing, mixed with the urine, for a day or so, and a smart attack of erysipelas of the face which is now on the decline, consequent on scratching a pimple on the forehead. But no urine has as yet flowed by the urethra, although the patient has experienced a forcing sensation in the perinæum, as if the urine were endeavouring to find its right channel, neither have I used a catheter. The fact that the water has not found its way by the meatus after the lapse of eleven days from the operation, I regard as an indication of the severity of the stricture, and my reason for delay in the use of the catheter is, to afford nature an opportunity by keeping the patient recumbent, and securing local rest to the part affected, of relieving congestion and dispersing some of the inflammatory deposit, which, encroaching upon the canal, is the cause of stricture. As a rule, in these cases, the urine begins to flow by the natural channel after the lapse of three or four days from the operation, and when it does so, the time for catheterism has arrived and will probably be successful, and if so, the canula may be removed from the rectum, while the catheter passed by the urethra is either tied in for a few hours, if difficulty in the introduction has been experienced or is withdrawn, and the case treated on general principles. To-day I shall attempt to introduce a catheter.

Sequel to CASE I.—On the eleventh day subsequent to the operation I attempted, but in vain, to traverse the stricture, the attempt causing unusual pain to the patient, and much more than average bleeding. From time to time, allowing several days to elapse between each trial, a futile attempt was made to reach the bladder with instruments, both solid and elastic, of various shapes and sizes. The stricture was not even entered and the suffering was severe. It was not until the seventeenth day from the operation that urine flowed per urethram.

On *April 7th*, two months from the date of operation, the excessive sensibility of the urethra persisting, I passed a piece of nitrate of silver, of the size of a pin's-head, down to the stricture, and allowed it to remain and be dissolved there. The application of this caused severe pain for a few minutes, but by its sedative influence I was enabled on the sixth day subsequent to introduce an instrument with

less pain to the patient. Finding also that the application
of the nitrate had not impeded the passage of urine per urethram,
I removed the canula from the bladder just nine weeks from the
date of operation. During the whole of this time the presence
of the instrument in the bladder caused no vesical annoyance
whatever, although, latterly, the urine was loaded with muco-pus,
and had a strong ammoniacal odour. This odour gradually vanished
under the influence of a scruple of Benzoic acid administered on the
average five times in the twenty-four hours during the space of
about ten days. It thus appears that a silver tube may be retained
in a bladder many weeks with comparative impunity, and perhaps
with great benefit as regards the stricture, but from another point
of view such detention is undesirable; it may engender stone
in the bladder. The presence of the canula for a long period
is a local source of irritation, and by inducing an extra secretion
of mucus from the coat of the vesica, the urine at length becomes
ammoniacal and a phosphatic concretion is likely to be deposited
about the tube. Under the circumstances the canula cannot be
renewed every few days so as to prevent this deposition, and
supposing such to have occurred, a fragment of this may be
detached, when the tube is withdrawn, and remaining in the bladder,
becomes the nucleus of a calculus. In the case before us, having
removed the canula with ease, I was gratified to find that a very
small quantity indeed of earthy matter adhered to it, and as this
was bevelled off at its borders none had been detached and left
in the bladder. I was certainly surprised to find so small a quantity
of calcareous matter upon the canula, and on reflection, am inclined
to attribute this fact to the effects of the Benzoic acid, which,
by keeping the urine in a state of acidity, either prevented a
deposition, or dissolved any that had taken place. Under circum-
stances then necessitating the retention of an instrument in the
bladder for a long and uncertain period, the administration of an
appropriate acid is indicated, partly to prevent the reaction of
alkaline products of inflammation upon the lining membrane of
the bladder, and partly to prevent and dissolve phosphatic deposist.
For a similar reason a highly-polished silver instrument is to be
preferred to one of softer material, as the latter becoming softened
and corroded upon the surface by the action of urine, affords a

favourable resting-place for deposits. (To illustrate the latter remarks, I may tell you, that some years ago, a boy was under my observation in a provincial Hospital, the subject of laceration of the urethra. An elastic catheter was retained in his bladder about three weeks, and on its removal was found to be much coated with calcareous matter. Soon, symptoms of " stone " appeared, and he was cut successfully for that malady.) After a second application of nitrate of silver the catheter could be borne with less discomfort by the patient, but it was not until the 12th of May, that a small instrument entered the bladder. The stricture was a long one, occupying about two inches of the posterior part of the spongy urethra. B. H. became an out-patient at the end of May, and No. 7 catheter could be passed.

CASE II.—*Organic Stricture—Perinæal Abscess—Perinæal Section*.

J. H., aged 36, experienced an attack of gonorrhœa eighteen years ago, and two years subsequently observed his stream of urine becoming small, a year later he had retention, again in a twelvemonth's time, again after an interval of four years, and then again after the lapse of five years, when he entered and remained in Bartholomew's Hospital four months, and No. 5 catheter could be introduced. During the three months prior to admission here the catheter was employed, but never passed the stricture.

On admission, July 25th, 1865, the urine flowed guttatim, and a small abscess, but how long it had existed the patient could not tell, was found in the perinæum, this I laid open immediately, and the next day the patient passed water both through the abscess and the urethra. After some days rest in bed, and the usual medicinal treatment, I attempted to pass a bougie through the stricture, but failed, and failed repeatedly afterwards, while the local condition became aggravated ; the perinæum instead of improving, growing more and more indurated, the wound becoming a mere fistula, and a second had opened. Such being the condition of parts, early in October I laid open the perinæum very freely in the mesian line, cutting through a mass of inflammatory products almost as hard as potato. For a few weeks subsequently the local condition improved, the induration subsided in great measure, and the wound closed rapidly ; still no instrument would pass the stricture, and indeed at no time would the posterior two-

thirds of the spongy urethra admit of a size higher than No. 6. On December 20th, the perinæum being still indurated, and the scrotum having been for many days in a state of subacute inflammatory œdema, I determined to make an attempt to reach the bladder by operation. The patient was placed in the lithotomy position, and a 6 catheter passed along the urethra down to the stricture and there held. By a free incision in the mesian line of the perinæum, the urethra was opened, and the point of the catheter exposed. I now, with a probe, endeavoured to discover the anterior aperture of the strictured portion of the urethra, but failed. Waiting a little for the hæmorrhage to cease, and having dried the part thoroughly, I detected a narrow glistening channel to the right side of the point of the catheter, and believing that to be the urethra, I laid it open with a buttoned bistoury, in a direction from before backwards to the extent of perhaps three-quarters of an inch, and was rewarded by being able to carry the catheter on into the bladder, in which viscus it was retained thirty-six hours, when, on its withdrawal, the urine flowed entirely through the wound. From this date the case progressed favourably, the wound gradually closing and the urine flowing partially by the meatus urinarius, and when made an outpatient on the 12th of February, 1866, the greater part of the urine was passed by the urethra, and No. 6 catheter could be carried into the bladder.

Compared with the previous case, how different is the history of this under consideration; the one patient was free from symptoms of stricture during twenty-eight years subsequent to the attack of gonorrhœa, the other was seized with retention three years after he had been the subject of venereal disease.

He has the aspect of an immoderate beer-drinker, and has led a very irregular life.

This patient was admitted passing water guttatim, as was not uncommon to him, a condition which might result either from a very tight stricture, or from the abscess found in the perinæum. Assuming that the latter might be the cause, I laid it open at once, for two reasons: firstly, to favour more free micturition, and secondly, with the hope that the urethra might not be opened by it. In this latter

hope I was disappointed ; on the following day urine flowed through the wound.   It is a rule of practice with me, in all cases of perinæal abscess, associated with very difficult micturition, to open the abscess before using a catheter ; by so doing, the instrument may not be requisite, and the risk of making a communication between the urinary passage and the abscess cavity is avoided.   I make, however, one exception to this rule—when the abscess has already opened into the urethra, as is known by the discharge of pus at the meatus independently of micturition, a catheter can often be passed, as in a case of uncomplicated stricture, and if so, the bladder should be evacuated periodically, say twice or thrice in the twenty-four hours, by means of the instrument, with the hope that the abscess cavity will contract and close as soon as the urine can no longer enter it, as it would do if allowed to traverse the urethra as in a state of health.

For many weeks the case was treated on general principles without avail. No catheter or bougie traversed the stricture and a second fistulous opening formed in the perinæum with increased induration.   This second fistula and augmented induration indicated the tendency to abscess and subacute inflammation, consequent, I thought, on the closing up of the original wound, while the stricture remained impermeable to instruments, preventing the free egress of urine at the perinæum, and causing it to burrow in the soft parts of that region in order to find a vent.   Acting upon that supposition I cut freely through this indurated tissue, and again for some weeks attempted, but failed, with the catheter even while the urine had a ready means of escape through the wound.   All this time the patient was kept in bed on a nutritious but unstimulating diet, and attention paid to the state of his urine.   It now became necessary to use more potent means of reaching the bladder through the stricture, and I had a choice of methods more or less applicable.   Escharotics and urethrotomes were scarcely considered, on account of the contracted state of a great portion of the spongy urethra ; I had already laid open the perinæum, with the bare possibility of striking the urethra, without success, and I selected as a *dernier ressort* the operation above described.   It succeeded, and the patient has been recently made an out-patient, still passing some of his water through the perinæum.

I

You will ask if the perinæal fistula is likely to close soon, and what means will be taken to further such closure? I expect a very long time will elapse before the fistula closes, by reason of the contracted state of a long tract of urethra anterior to it forming an obstacle to the onward flow of urine on account of its inability to dilate beyond the dimensions of No. 6 catheter. As regards the means to be employed to assist Nature in her work of repair, the patient will be taught to pass a catheter for himself and never to micturate except through it.

By this method, the fistulous communication, being no longer necessary as a safety-valve against retention, may be closed.

Sequel to CASE II.—J. H. has presented himself occasionally among the out-patients, and I have usually succeeded in introducing No. 6 catheter. The patient himself passes an instrument now and then, but not with sufficient regularity to insure closure of the fistula, which is still open. His general condition is such as to lead me to suspect that he has organic disease of the kidney.

CASE III.—*Urinary fistulæ at the hip; communicating with the bladder?*

R. D., aged 16, was admitted January 25th, 1866, with several openings about the right hip through which urine flowed during micturition. Some of these apertures resulted from disease of the hip-joint many years ago, but had all been closed five years previous to the commencement of his present malady. Twenty months since he fell down a trap and struck the body of the right pubic bone, and although carried home, he went to work as usual on the next day. Three weeks from the date of the accident he experienced pain in the hypogastric region, followed, in a day or two, by gradual and then complete retention of urine for forty-eight hours, relieved at last by the catheter which was introduced with difficulty and was accordingly retained for a space of forty hours. On the day subsequent to the removal of the instrument, the catheter was again requisite, but during a sojourn of three weeks in Hospital he passed water voluntarily. During ten months following the accident the boy went to work as usual, but at this period a swelling arose

near the right antero-superior spine of the ilium, in which there was a smarting burning pain on micturition. This was opened artificially and gave exit to pus and urine ; and other sinuses, about the upper part of the thigh and hip, which formerly discharged pus when he was labouring under hip-disease, reopened, and urine flowed from them during micturition. Soon after the attack of retention the urine was observed to contain pus, but there has never been a urethral discharge.

Some half dozen apertures about the right hip give exit to urine when the patient urinates.

The first point of interest in this case is the origin of these urinary fistulæ; are they the result of an abscess in the pelvis as a sequel of old hip-disease, or had the fall upon the pubis any share in their production ? I am inclined to accept the former proposition, because, had the blow been sufficient to give rise to suppuration within the pelvis, I should have expected evidence of earlier symptoms than those which arose three weeks after the accident; nothing short of fracture of the pubis would, I presume, have sufficed for the result in question, but the history of the case leads us to no such conclusion—there was no hæmorrhage from the urethra, the urinary organs performed their functions as usual, and the boy went to work the next day. On the other hand, there are several cicatrices about the hip and upper part of the thigh, relics of old hip-disease, most of which have at one time or another given exit to urine; and as the head of the femur is not in the acetabulum, but upon the dorsum ilii, there is no mechanical obstacle to the passage of fluid through that cavity, supposing it to be perforated. I am of opinion that the urine has made its way out of the pelvis chiefly through the acetabulum because, until lately, no fistulous opening has been established above Poupart's ligament.   Now as to the point at which the sinus communicates with the urinary passages, whether within or without the pelvis ? The external organs of generation and the perinæum are perfectly healthy, therefore the communication must be within, and the finger in the rectum can detect no abnormality through the walls of this viscus, either in the prostate or other

locality, and one is, therefore, conducted to the bladder as the seat of communication.   If this be the correct view of the case I should not be surprised if a fragment of bone found its way into the bladder as a consequence of cario-necrosis of the acetabulum. Also, I found on inquiry, that at one time there was a discharge of matter by the urethra, but this was always mingled with urine and was only seen at the time of micturition, a clear proof that its source was not anterior to the bladder.

Treatment.—The case before us is peculiar, from the fact that the fistulæ communicate with the urinary passages within the pelvis, and if the assumption be correct—that the commuincation is with the bladder —the principle of treatment for perinæal fistulæ will not be applicable. Our first object will be to pass an instrument into the bladder, and having done so, the next step will be to keep that viscus always empty by means of the catheter retained for the purpose; in fact, to convert the reservoir into a simple channel of communication between the vesical end of the ureter and of the urethra itself.   To allow urine to accumulate in the bladder, and to empty this viscus periodically with a catheter, would I fear be insufficient, because I can imagine, that as the bladder dilates by the accumulation of urine, some of this fluid (in accordance with gravity) finds its way into the sinus which feeds the fistulæ, and prevents its closing, independently of the possible presence of a piece of dead bone.   At present the sinus is not allowed to close by the action of the *detrusor urinæ* muscle, which, when called into play, forces a portion of the urine along the urethra and a portion along the false passage. I shall also desire the patient to lie as much as possible on his left side in order that urine may be as far removed as possible from the right side on which the sinus is situated.

Sequel to Case.—On February 20th.   After two or three trails, a short silver catheter was passed along a tortuous urethra into the bladder and retained for three days, the urine flowing away through an India-rubber tube adjusted to the instrument.   At the end of this period the boy complained of hypogastric pain, loss of appetite and of rest, and of other symptoms of constitutional disturbance necessitating the removal of the instrument.   Still this attempt was not without local benefit, for with one exception the fistulæ closed.

For some three or four weeks nothing was done locally, and the patient gained flesh.

Having recovered the effects of the retained catheter, and this plan being impracticable, it was thought that periodical evacuation with a catheter was the next best method, on the principle already explained, the patient being cautioned against exercising volition and assisting to expel the urine when the catheter was in the bladder. Gentlemen, resident in the Hospital, undertook the task, but were unable to introduce the catheter, and I must say, in justice to them, that the case was a difficult one to manage, the urethra being tortuous, and a kind of bar existing at the neck of the bladder.   This plan was therefore abandoned.   After the lapse of a few days, to allow the urethra to recover from the effects of the recent catheterism, I determined to try retention of an elastic catheter in the bladder as the last and probably only chance of cure.   About the 15th of April I fastened a No. 5 elastic catheter in the bladder, and having attached a piece of India-rubber tubing to the former, the urine was allowed to flow from the bladder as fast as it entered that cavity.   On the eighth day the catheter was replaced by a new one in order to avoid accumulation of calcareous matter upon it, but on the tenth day this instrument accidently slipped out and was not replaced during twelve hours, and in this interval the patient micturated twice voluntarily.   The catheter was re-introduced, but becoming obstructed was removed.   During the first ten days in which the instrument was kept in the bladder, not a drop of urine appeared at the fistulous aperture in the groin, and the urine was always normal; but during the few hours when the catheter was not in the bladder, and also, when after its re-introduction its channel became obstructed, a few drops of urine passed from the groin.   These accidents occurring late in the course of this method of treatment, doubtless interfered with the successful issue of the case for the time, and as the urine was likewise becoming a little cloudy, I deemed it prudent to omit treatment altogether, with a view to re-adopt the same method after giving an interval of repose to the bladder.

LECTURE III.

Retained testis ; bubonocele ; gangrenous gut.

CASE I.—J. M., aged 20, came under Mr. Maunder's care March 4th, 1866. He had been more or less ill, vomiting being one of the chief symptoms, during six days prior to the operation, and it appeared that his case had been regarded as one of inflamed retained testis. His bowels had responded to aperients up to Friday evening, forty hours previous to operation. Since then vomiting had persisted, the ejecta being yellow, and then decidedly stercoraceous. On examination, he was found to be the subject of an ovoid tumour in the inguinal canal projecting through the external ring ; it was firm and moderately tense, and when compressed, gurglings were felt as when a portion of bowel containing air and fluid is present, and these contents could be slowly pressed to and fro. At 4 P.M. the patient was seen by Mr. Maunder who, supposing the case to be one of retained testis associated with strangulated congenital hernia, operated at once.

He found a hernial sac containing a knuckle of small intestine, adherent by recent lymph throughout, of a dark red colour, relieved at two points on the convexity of the gut by an ashy spot ; an inch and a-half of sound bowel intervened these spots. He now nicked the stricture seated in the neck of the sac so as to establish a communication between the cavity of the bowel within, and the bowel without the abdomen, and left the diseased knuckle in the sac. Opium was freely administered, and on the day subsequent to the operation the bowel gave way at the points which were of an ashy hue, and an artificial anus was established. Fæces of a brown tint flowed at the wound ; vomiting recurred, and the patient died on March 10th, the sixth day from the operation.

At a *post-mortem* examination the intestine which formed the

hernia was found to be perforated at two points, corresponding with the ash-coloured spots alluded to, and this knuckle of bowel formed a half twist upon itself. It was adherent to the sac, and recent lymph effused within the ring also maintained the hernia *in situ*. The whole intestinal canal exhibited a dark purple colour (venous congestion). The testis, smaller than natural, was lying upon the inner border of the psoas muscle below the level of the internal ring.

GENTLEMEN,—The first point to determine in cases of vomiting associated with a tumour in a favourite hernial region, is the connection between the swelling and the above symptom, and in all cases in which the physical examination does not allow you to come to a positive conclusion, the nature of the tumour must be determined by an exploratory operation. This is a rule in practice never to be forgotten and always to be acted upon on the ground that it is more desirable to submit a patient to a comparatively trivial operation, than to permit him to succumb to an unrelieved strangulated hernia. But the case before us was even more complicated than the above remarks would lead us to suppose; not only was there a tumour in the inguinal region, but there was an absence of the testicle of the same side. It therefore becomes necessary in such a case to determine whether or not the swelling in the groin be the testicle or not, and if not, what is its nature? Now I shall not trouble you here with a differential diagnosis of the various tumours met with in the inguinal region, but refer only to the probable presence of a strangulated hernia. It happens that an undescended testicle is equally liable to disease as when it has reached the scrotum, and supposing it to become the seat of acute inflammation while confined in a comparatively unyielding passage, such as the inguinal canal is, you can readily understand that the patient's sufferings will be severe, and strangulated hernia may be simulated. Vomiting, a countenance expressive of pain, with more or less local tenderness will be present. I have never witnessed a case of inflamed retained testis, but should suppose, judging from the pain of orchitis when seated in the scrotum, that the exquisitely tender state of the organ would distinguish it from hernia. But, gentlemen, in a question of so great import, it would be wrong to form a diagnosis upon one symptom (pain) which, supposing the disease equally severe in all, would be so differently expressed by

individuals on account of their varying nervous sensibility, and there is still a means of determining the diagnosis which, in a case where delay is dangerous, must be resorted to—an aperient must be administered, and its effects be awaited a few hours, when, if the continuity of the alimentary canal be proved by a copious alvine evacuation, no operation will be necessary, because a strangulated hernia does not exist, and our chief anxiety will be set at rest. In this instance I performed herniotomy as soon as I had examined the patient, and having seen the condition of the gut, the question arose, what was to be done with it? There are three methods of dealing with the viscus in its then condition, each of which has its advocates— to leave it in the sac—to lay it open and leave it, or to stitch its margin to the wound when so laid open—to return it into the abdominal cavity. I selected the first method, in preference to either of the others for two reasons; first, because although I believed that the tissue of the viscus was beyond restoration at the ashy spots alluded to, yet it is impossible to be absolutely certain that the cavity of the gut will be eventually opened by the morbid process at work, and no gain could accrue by anticipating nature after I had nicked the stricture and established a continuity between the interior of the bowel above and below the constriction. Secondly, I did not return the bowel into the abdomen, because the gangrenous points were about one inch and a-half apart, and as it would be impossible to place both of these just within and opposite the ring, so that, should the gut give way, its contents might have a direct mode of exit, I left it. I feared the possibility of extravasation of fæces before nature would have time to form a barrier about the injured portion of the viscus. Had only one suspicious spot existed, I should have returned the hernia whence it came, on the principle that the abdominal cavity is the most desirable situation for a portion of bowel. There is one circumstance in this case well worthy of note, and that is, the presence of an acquired hernial sac in a man of twenty, associated with an undescended testis. The more usual arrangement is that which was erroneously thought to exist here—a partially descended testis associated with a congenital hernia.

CASE II. —*Strangulated femoral hernia ; opium dangerous* before, *but very valuable* after, *reduction ; exceptions to this statement.*

C. A., a feeble-looking woman, aged 56, has been the subject of a reducible hernia during five years. Felt something crack in her groin, when over-reaching, and a month after this found a lump in that region.

To-night, *March 13th,* 1866, she states that the lump has remained down for the last forty-eight hours, during which her bowels have been confined and she has vomited repeatedly. There is a small globular tumour in the left groin, not very tense (the taxis had been applied at home just previously with the effect of diminishing the size of the tumour) ; tongue furred, pulse feeble, surface rather cold, but the night is excessively cold also.

Chloroform was administered, and the hernia returned without opening the sac, the incision being made at the inner side of the neck of the tumour. A compress and bandage were applied, and one grain of opium administered ; milk and beef-tea diet.

March 14th, 3 P.M.—Was very comfortable during eight hours subsequent to the operation, when a cup of tea was returned from the stomach, and vomiting attended by hiccup persisted till she was seen by Mr. Maunder at 3 P.M.

Now there is also tympanitis without abdominal tenderness, and a very feeble quick pulse. To have two ounces of brandy cautiously administered.

Five P.M. No sickness since she partook of some brandy.

15*th.* No more sickness ; abdominal distension has subsided, and flatus has escaped per anum.

20*th.* Bowels opened spontaneously on fifth-day. Patient is convalescent.

Many cases of hernia have symptoms common to all, but most are characterized by some peculiar features. I wish to draw your attention to the condition of this patient a few hours subsequent to the operation, and also to the use of opium, in cases of strangulated hernia, both before and after operation. You will have remarked that during the first hours after operation there had been

no return of vomiting, but then sickness set in and the patient was unable to keep anything on her stomach; there was also occasional hiccup associated with a good deal of tympanitis (no flatus having passed per anum) and a very weak pulse when I saw her at 3 P.M., fifteen hours after operation. Altogether she was in a very unpromising condition. What was the cause of these symptoms? I examined the groin and found that the hernia had not redescended; with the exception of tympanitis there was no other evidence of peritonitis, and I believed this disease was not present; but I came to the conclusion that my patient was suffering from asthenia (extreme debility). She was a weakly-looking woman, and her feebleness had been greatly increased by vomiting and want of nourishment during some fifty hours. Acting on this belief, I ordered her two ounces of brandy, with the most satisfactory result. She was not sick after taking a portion of it, a large quantity of flatus was gradually passed per anum, and on the following day when I saw her, the tympanitis had subsided and the belly was flat. The vomiting was no doubt due to pressure upon the stomach by the distended intestines, the distension arising from general debility, and persisting from an inability on the part of the muscular coat of the bowel, to contract upon its contents. A stimulant was indicated, and I have no doubt the two ounces of brandy saved the patient's life. Vomiting persisting for some hours after the exhibition of chloroform, is not infrequent, but in this instance the stomach was quiet for several hours after the operation. The above symptom therefore cannot be ascribed to the anæsthetic.

Now, as to the use of opium in strangulated hernia. Speaking generally, I may say that this drug is a dangerous remedy *before* reduction, either with or without operation, but a valuable agent *after* reduction. There are exceptions to both statements.

In a case of strangulated hernia, I never order a dose of opium unless I have previously determined to effect reduction in the course of a certain space of time by operation, when the taxis assisted also by chloroform or warm bath fails to do so. I adopt this plan when strangulation has existed a few hours only and I have reason to expect that the constriction is not unusually tight.

Under such circumstances, aided by ice to the tumour, a hernia will sometimes reduce itself, or be readily replaced, either by the

patient himself or by his surgeon.   But supposing the principle upon which opium is to be employed is not understood, the consequences may be most disastrous.   The drug checks vomiting, alleviates pain, and has a grateful influence upon the patient generally.   But under these apparently happy effects, a morbid process is steadily at work, and the necessary operation is perhaps only performed when the pathological condition of the hernia renders it no longer capable of performing its function.   An untimely dose of opium, besides blinding the unwary medical practitioner to the actual condition of his patient, may have a very unfavourable influence upon the mind of the sufferer himself.   To illustrate this statement, I will call to your recollection a case of strangulated hernia, in the person of J. W—b., a patient, under my care, in Devonshire Ward, about three months ago.   This man had been the subject of hernia for some years and usually kept it reduced, but once or twice previously it had redescended for a few hours, but had occasioned no serious consequences.   This time, however, the symptoms had been sufficiently urgent, and before I saw him, a dose of opium had been administered with the effect of relieving all pain, and of checking that functional derangement of the stomach (vomiting) upon which we place much reliance as an evidence of strangulation.   He was so comfortable that he at first refused my aid altogether, and at length gave an unwilling consent that if the taxis under chloroform failed, I might use the knife.   The operation disclosed a very tight stricture at the neck of the sac.   The man recovered.

So much for and against the administration of opium previous to the reduction of a hernia.   I will now draw your attention to the use of this drug after reduction.   The extent of the injury inflicted by strangulation upon a portion of intestine will vary from a variety of circumstances, to which I need not allude.   Granted that the bowel has been strangulated, its tissues will be diseased from, in one case, simple congestion to, in another instance, actual mortification; in all, rest for the injured viscus will be beneficial, in the last it is essential to the patient's already poor chance of recovery.

The principle upon which opium is to be administered after the reduction of a hernia, is that of procuring *repose* to the damaged bowel, and it operates probably in two ways—it checks secretion and

exhalation in the various glands and canal forming the chylo-poietic viscera, and thus by depriving the alimentary canal of its natural stimulus to contraction, peristalsis is in abeyance—through its influence upon the nervous system also the muscular system is weakened, and irritability of bowel-surface is diminished, tending also to prevent peristalsis.   Thus, under the influence of opium, time is afforded for Nature to repair the injured gut in order to render it fit to perform its function, as forming part of a tube along which certain substances have to pass, and which, should they arrive too soon, might either lead to perforation or to dangerous inflammation. Again, should perforation be inevitable from the first, time is afforded for Nature to step in, and by the effusion of lymph, to prevent fatal extravasation into the peritoneal cavity.   But, Gentlemen, notwithstanding the incalculable value of opium at this stage, I am of opinion that there is one condition in which its use may well be dispensed with, if it be not indeed fraught with danger.   The case before us will illustrate my meaning.   It is usual (and ninety-nine times out of a hundred the custom will be advantageously followed) to give a dose of opium, one or two grains, after reduction of a hernia of many hours strangulation.   For reasons already mentioned, I pursued the usual practice in this patient, a feeble little woman, in whom you will recollect alarming symptoms recurred after an interval of convalescence, and I am inclined to think that the grain of opium might have had an injurious effect.   Opium diminishes the power of contraction in muscle, and as the muscular coat of the bowels in this patient was already scarcely capable of resisting distension by the gases accumulating in their cavity by reason of her feebleness, the drug probably rendered it still less able to do so and helped much to bring about the symptoms.   You will ask how are you to determine when to withhold the opium ?   If I reply,—From the feeble subject, you will say that is very indefinite, and so it is.   I think therefore the best advice I can give you is that by which you will do right in the great majority of instances—give a dose of opium in all cases to insure rest to the injured bowel, but watch your patient closely, and directly you observe symptoms of failing power, as indicated by a gradual and painless rising of the belly (tympanitis) and by the pulse, resort to stimulants, and of these brandy is very valuable.

    With regard to the operation itself, although in this case and one

other performed in the same week, the steps were simple enough, yet you must understand that in no case of herniotomy can you foretell what difficulties may arise in the course of its progress. The two cases alluded to occurred in spare subjects, almost devoid of subcutaneous fat, and as you witnessed Gimbernat's ligament, which was the seat of stricture in both instances, was readily reached, the cutting part of the operation being completed probably in the space of a minute.   In thin subjects I usually make my incision on the inner side of the neck of the sac, in order that, should the patient recover, the cicatrix may be as far removed as possible from the pressure of the truss pad.   In fat subjects, or when the tumour is large, and the wound must necessarily be deep, rendering the seat of stricture more difficult to attain, I select the centre of the neck of the tumour for incision.   Whatever spot you choose for incision, take care, in deepening your wound, to divide the different layers of tissue in the same line with the first incision, and don't allow an assistant to drag upon one edge of the cut only, lest you loose the relation between the incision in the skin and the situation in which you had intended to sever the deeper structures.   You will divide the various structures on a director, and in inserting this instrument take care to keep the point of it well up against the structure to be divided, lest otherwise you open the sac with it unintentionally and possibly wound the contents thereof.   For my own part, having had a fair amount of experience in herniotomy, I rarely use a director, except for the passage of the knife which is to nick the stricture, and only occasionally to open the sac do I employ the forceps.   By manipulating the parts as little as possible, I can sometimes insure primary union of the wound even in Hospital.

The after-treatment has been alluded to, and should be conducted on general principles.   The patient should not assume the erect posture until a truss can be worn.

Strangulated inguinal hernia ; partial reduction ; treatment of irreducible portion.

CASE III.—R. E. G., male adult, aged 50, has been ruptured five years, and during this period has worn a truss, which, except on one occasion, kept the hernia up.   The rupture is on the left side and of the inguinal variety, and has been irreducible for about five

hours. The scrotal swelling is very firm and tense and no impulse is communicated on coughing; vomiting has occurred twice. Chloroform was administered at once, but the taxis failed to effect reduction, and he was ordered to take two grains of opium, to support the scrotum with a crutch pad and to have ice constantly applied to the tumour. This was at 9 P.M. on the 18th of March, 1866, and Mr. Maunder arranged to see the case again in three hours' time. At midnight the tumour was much as before, and the patient, though he had not slept, felt very comfortable and dozy. Chloroform was re-administered, and at least half the tumour was reduced with the rapid ascent of a portion of it. The remainder resisted a prolonged taxis, but Mr. Maunder was satisfied with the result, and sent the patient to bed, leaving instructions that he should be sent for in the morning if symptoms persisted. No opium.

March 19th.—The patient is as well as usual, and now he admits that he has had a lump in his scrotum along time, although he ignored the fact yesterday. Ordered to remain constantly recumbent, to have middle diet, and take as little fluid as possible; to take three grains of grey-powder every night and a dose of house-medicine occasionally, the scrotum to be supported by a crutch-pad, and a bag of ice to be worn night and day upon the tumour.

April 7th.—The tumour is decidedly smaller. The gums are slightly tender. Omit the grey-powder, but continue the ice, &c. About one and a-half pints of fluid have been taken during each twenty-four hours, and he uses a urinal and bed-pan. On one occasion he was found *sitting up*, resting on one elbow, drinking his tea, and it cannot of course be said to what extent the patient has broken the rules enjoined upon him. After six weeks' trial, the tumour not having perceptibly diminished in size during the latter half, chloroform was administered and the taxis perseveringly applied in vain. A hollow truss was ordered and the patient discharged.

He presented himself among Mr. Maunder's out-patients on the 18th of May, and expressed himself well-pleased with the truss.

On visiting a patient with strangulated hernia, I make it a point to endeavour to discover whether or not up to the period of strangulation the tumour was altogether reducible. If your patient be an adult you will probably be able to appeal to himself alone concern-

ing this fact, and must be prepared to be often incorrectly informed, not wilfully, but from carelessness or ignorance of the truth. You are of course aware that many persons are the subject of an irreducible hernia, which probably has not for years given them serious inconvenience, but at length a further descent of bowel takes place, and strangulation is the consequence. The advantage which the knowledge of the existence of an irreducible hernia, in such a case as I have mentioned, is two-fold. First, it often allows the surgeon to relieve his patient by what may be termed an incomplete operation. Secondly, the patient is exposed to less risk by the incomplete operation which is alone necessary to his relief.

The case before us will illustrate my meaning. On interrogating my patient, before commencing treatment, about the history of the tumour, he stated positively, that except once during the last five years, there had been no unnatural swelling in his groin. But you will recollect, that when we were attempting reduction by the taxis, only a part of the solid portion of the tumour went up, and I continued my attempts for some time longer, with the hope of reducing the whole. I did not succeed, and for a sufficient reason. On the following day the patient admitted that there had been " something of a lump" in his groin for many years, but did not think it was of consequence that I should know, although, as you remember, I questioned him about it.

The first disadvantage which incorrect information on this point led to, was the prolonged use of the taxis ; complete reduction was impossible, either from old adhesions or the size of the rupture.

Finding that only a portion of the tumour could be reduced, I presumed to set aside the statement of my patient and acted on the hypothesis, that I had to deal with an irreducible hernia, capable, under its usual condition, of performing its functions, and that the symptoms (vomiting being the chief) had been caused by the recent descent of a piece of bowel. Thus, we had in the sac, old irreducible hernia, and recent knuckle of gut, and as the tissues around the mouth of the hernial sac did not yield in proportion to the dimensions of the new protrusion, strangulation resulted.

Suppose now that I had accepted the patient's statement as infallible, observe what might have happened. Had I not thought it

safe to send the patient back to bed with the tumour only partially
reduced, I should have resorted to the knife, and having severed the
tissues external to the sac and again applied the taxis in vain, I
should have opened the peritoneal investment to discover that I had
operated unnecessarily and exposed my patient to great danger.   I
need scarcely say, that to do what I have pictured to you as possible—
to use the knife at once when the tumour has acquired the physical
character referred to combined with absence of tension, would be
bad practice indeed.

The method of treatment adopted should be your guide in similar
instances.   The patient is to be put to bed, and to be carefully
watched ; no anodyne is to be administered, for reasons already
stated, and should sickness recur and persist longer than you think
may be ascribed to the effects of chloroform only, herniotomy must be
performed and the contents of the sac be examined.   In the case be-
fore us, the patient's bowels were moved on the following day, and
he was restored to his usual state of health.

I must now return to an earlier period of the treatment.   We
found on inquiring into the history of the rupture, that it had
existed some five years, and symptoms of strangulation set in five
hours previous to my seeing him.   The tumour was very tense, and
chloroform having been administered, the taxis was employed, but in
vain.   Having failed with the taxis aided by chloroform, some of
you might think an operation immediately necessary, but I did not
resort to the knife for certain reasons.

The rupture was not recent (five years' duration), and therefore I
did not expect the mouth of it to be so small as to endanger the
integrity of the bowel by the additional three hours of strangulation
to which I allowed it to be subjected while I tried certain remedies
to favour reduction.   These remedies were ice and opium, the former
to prevent the ingress of arterial blood, was applied in an India-
rubber bag to the tumour ; and of the latter, two grains were admin-
istered by the mouth, to allay pain, to procure muscular relaxation
and favour sleep.   This treatment was adopted at 9 P.M., and I
arranged to see the patient again at midnight.   I have elsewhere
stated that, as a rule, opium is a dangerous remedy in strangulated
hernia *before* reduction is effected, but the case before us is an excep-
tion to the rule, because the principle upon which the drug was

employed was understood. I had determined, prior to administering the narcotic, to perform herniotomy after the lapse of three hours (making eight or nine altogether in which strangulation existed) provided the taxis, thus aided, failed to effect reduction. The result of the treatment was very satisfactory. Chloroform was again administered, and partial reduction of the tumour was accomplished by the taxis, and the patient was restored to his usual condition. In a similar case I should be disposed to employ subcutaneous injection of morphia, in order to save time. I may say that I expect much more good from all the aids to the taxis which we possess, in a case of inguinal than in an instance of strangulated femoral hernia, on account of their different anatomical relatious. The former, passing among muscles, is likely to rouse their irritability and excite spasm by its mere presence, to say nothing of the stretching to which the lower fibres of the internal oblique and transverse muscles are subjected as they cross from without inwards the neck of an oblique hernia. So, in a less degree, would the muscular fibres of the external oblique muscle be excited to action by a hernial protrusion stretching or separating one from the other the pillars of the external ring, and these would constrict a hernia. The latter, (femoral) passing through a ring bounded by tissues scarcely affected by muscular action, is little influenced directly by agents favouring muscular relaxation. But besides the direct action of chloroform, opium &c., the indirect effect of these agents is a great help to the taxis, equally both in inguinal and femoral hernia. When the patient is *thoroughly* under the influence of chloroform (a physiological state highly conducive to successful taxis) volition is in abeyance and the muscular walls of the abdomen cannot be then employed by the patient in diminishing the capacity of that cavity nor in pushing the viscera down upon the ring by which the hernia has to return into the belly, and so offer an obstacle thereto.

I have spoken of the taxis as a means of reducing a hernia, and that this should be successfully employed the principle of its action must be well understood. It is not sufficient to seize the tumour and force it against the structures upon which it is lying. Such proceeding would very generally frustrate your object. The tumour is to be taken into the hands, or between the fingers of both hands, and be gradually and continuously compressed *upon itself*, the pres-

sure being slowly augmented and maintained for a space of time varying from five to fifteen minutes and while compression is employed a direction is to be given to the tumour the reverse of that by which it made exit from the abdomen. Thus, you will see that it is essential to the success of the taxis that the variety of hernia to be operated upon be recognised. Having then by compression diminished the bulk of the tumour—by preventing the influx of arterial blood, by expressing venous blood, serum that may have been in the sac, or any excrementitious contents of intestine, the tumour is to be kneaded in the direction of the mouth of the sac, and reduction, if not impossible from physical causes which we cannot influence by this means, will be effected. See the different effect of the two kinds of pressure referred to, upon this India-rubber bottle. Let the mouth of a hernial sac be represented by the ring formed by apposition of my finger and thumb and the bottle the contents of the sac. If I push it thus bodily against the ring it spreads out *around* that aperture, but when I compress it upon itself gradually and force the air out of it, the long axis of the bottle is in a direct line with the ring formed by my fingers, and the possibility of reduction is increased manifold. So is it with a hernia.

The following day found our patient in his usual condition, the bowels had been moved spontaneously and there was a diminished swelling along the cord. Was the patient to be discharged in that state? You can readily understand how great a discomfort must be the existence of an irreducible hernia, not to mention the constant danger of strangulation by extra descent of bowel to which the subject of it is exposed. A truss, often inadequate to the purpose, is adapted with difficulty and worn with more or less pain, and to rid the patient of such annoyance is desirable. I determined to make the attempt in this instance, and adopted a mode of treatment recommended by Mr. Hilton. The more frequent physical causes of irreduction are—a growth of the hernia, such as a deposit of fat in omentum; adhesions of the contents of the sac to the surface of the latter and contraction of the mouth of the sac. This latter often has the effect of inducing atrophy in the tissue which it transmits to a surprising extent. I have seen an omental hernia connected with the mass of omentum in the cavity of the abdomen by a mere thread of membrane, a condition induced no doubt by constant pressure.

To determine the precise nature of the impediment or impediments to reduction during life is probably absolutely impossible, but knowing the chief causes which usually exist we must act accordingly. The chief objects to be obtained by treatment are a diminution in the size of the tumour, and a breaking up of the adhesions. The size of the tumour depends partly on the solid and partly on the fluid constituents; the former being principally represented by fat and the latter by blood, both venous and arterial. To favour the absorption of fat the patient should be kept on a spare diet, and to lessen the quantity of blood circulating in the rupture as little fluid as possible should be taken by the mouth; a hydrogogue cathartic should be administered twice or thrice a-week to unload the portal system, while the recumbent posture is to be constantly maintained by the patient. Locally, the tumour is to be supported by a crutch-pad to favour the return of venous blood, and ice is to be constantly applied to prevent the entrance of arterial blood. Besides this, Mr. Hilton advises three grains of Hyd. c. Creta every night, with a view to absorption of adhesions. Whether or not much can be effected by this latter remedy upon old adhesions, I am unable to say. To bring about the desired result this treatment must be continued for some time, and in order that it may have a fair chance of success you must explain to your patient that improvement in his local condition will be slow, and the method irksome, and unless he be prepared to follow your advice strictly, you had better not attempt to relieve him.

NOTES OF UNSUCCESSFUL AND SUCCESSFUL

CASES OF SALINE ALCOHOLIC INJECTIONS INTO THE VEINS FOR
RELIEF OF COLLAPSE OF MALIGNANT CHOLERA,

TREATED DURING THE EPIDEMIC OF 1848-9.

By Dr. LITTLE,
LATE SENIOR PHYSICIAN TO THE LONDON HOSPITAL.

CONTENTS :—Preliminary observations—Nature of injecting apparatus—
Cases—Report of Dr. Letheby on the analysis of the urine passed by
a patient after venous injection—Some conclusions as to venous injec-
tions in general.

THE subject of Malignant or Asiatic Cholera is, in Great Britain,
at the present moment happily of no great threatening importance, I
am, however, induced to lay before my professional brethren in some
detail, the following cases of unsuccessful and successful instances of
therapeutic injection into the veins of salts, water and alcohol,
during the epidemic visitation of 1848-9, because the successful
cases are unique, the practice of such injections not having been
resorted to elsewhere than at the London Hospital during that
epidemic. The fact of recovery, without peculiar accidents after
such injections, has an important physiological and pathological as
well as therapeutical bearing. In the event of the occurrence of
future epidemics in this country, they may also serve as a sign-
post to some physician placed in a favourable position for making
tentative experiments in therapeutics, or they may even aid the
physician in combating the last stage of this frightful malady, in the
various parts of the globe, still too frequently visited by it.

These cases confirm the ability of the economy to bear the direct
infusion into the circulating fluid of considerable quantities of not

inert ingredients, and whether or no recovery in the successful cases be generally believed to have been in any degree attributable to the injections, the cases will, I believe, be admitted, to show that during their after-progress, no unfavourable phenomena occurred which are not natural to persons recovering from cholera-collapse.

The notes of the cases here presented, are printed exactly as they were written out at the time of treatment. They may, perhaps, be curtailed with advantage to the general medical reader, but I prefer to let them appear in their original form, that being, in my opinion, the form in which they would be most useful to any Physician purposing to make studious trial of the method.

I have witnessed too much of the appalling incompetency of Art during the cholera visitation of 1832, and 1848-9, to effect more when severe collapse of malignant cholera has taken place, than snatch a bare majority from death, and that when the extreme stage has been reached, the Physician will be compelled to look on powerlessly until some heroic mode of resuscitation more permanently effective than venous injections as hitherto practised, has commonly been, to be induced to seek by the detailed publication of these cases to establish the mode as a remedy for cholera-collapse. But I have faith that the means capable of even temporarily reviving most of the worst moribund cases, may, by study, by repetition and careful observation, and improvement as to apparatus used—ingredients and mode of operation—be made effectual in a greater proportion of instances.

A very brief mention of these cases was made by the author in an oration before the Hunterian Society in 1852, and similar mention was made to the Cholera Committee of the Royal College of Physicians about that time. But no detailed notes of Alcoholic Saline injections have hitherto been published; such notes, as may enable the experienced physician, accustomed to weigh evidence, to judge whether death in the unsuccessful cases was hastened by the injections, and whether recovery in the successful cases was aided by, or essentially modified by them. Although originally induced in 1832, to try venous injections through the theoretic suggestions of Dr. O'Shaughnessy, and the practice of Dr. Latta, which was reported in the periodicals of that date to have been followed by marvellously successful results, my experience at that period was attended with unfavourable results.

Dr. O'Shaugnessy, after analysis of the blood in cholera, proposed to re-oxygenate the dark blood by venous injection of a solution of chlorate of potash,—a salt combining a large proportion of atoms of oxygen. He also recommended trial of weak alcholic solutions.

Dr. Latta, of Edinburgh, took the initiative in the practical recognition of Dr. O'Shaugnessy's recommendation of venous injection in cholera. Dr. Latta injected into a vein in the elbow, pint after pint of a solution of common salt and carbonate of soda, salts of which the blood had been deprived during the vomiting and purging of this disease. The restorative influence of the injected fluid was so strikingly apparent, and the expressions of relief by the sufferer so much surpassed expectations, that he was encouraged to persevere, hundreds of ounces having been thrown into a single patient in the course of a few hours. In nearly every case the same extraordinary relief was obtained, although, in the majority, it was only temporary. The journals of the period show that of fifteen cases of cholera-collapse, operated by him, one-third recovered. I will here quote Dr. Latta's description of the phenomena observed during the injections :—

"There is at first but little felt by the patient, and the symptoms continue unaltered until the blood mingled with the injected liquid becomes warm and fluid. The improvement in the pulse and countenance is almost simultaneous ; the cadaverous expression gradually gives place to appearances of returning animation ; the horrid oppression at the præcordia goes off ; the sunken, turned-up eye, half covered by the palpebra, becomes gradually fuller, till it sparkles with the brilliancy of health ; the livid hue disappears ; the warmth of the body returns, and it acquires its natural colour ; words are no more uttered in whispers ; the voice first acquires its true choleraic tone, and ultimately its wonted energy ; and the poor patient, who but a few minutes before was oppressed with sickness, vomiting, and burning thirst, is suddenly relieved from all distressing symptoms."

Every observer of venous injection in cholera, will admit that this forms no exaggerated picture of the primary effect of the process upon many apparently hopeless cases of collapse.

Many practitioners followed Dr. Latta's example. Dr. Tweedie may be mentioned, in whose hands one case in four is reported to have recovered. Dr. Craigie, of, Edinburgh, who had one recovery and one death ; Dr. Murphy, two recoveries and one death ; Dr.

Girdwood, four recoveries and three deaths, and Mr. Arthur, of Shadwell, thirteen recoveries and five deaths.

In 1832, I was induced to add alcohol to the solution injected, in consequence of the small and transient reaction, I had once or twice observed after the injection of common salt, carbonate of soda, and chlorate of potash.   The reaction after injection of a mixture of hot water, salines and alcohol, was more lasting than after injection of water and salines only.

I have notes of six cases injected at this period, all of which succumbed. These attempts were made upon the most unpromising cases of collapse ; they were usually done with all the haste, imperfections of injecting apparatus, insufficiency of assistance and other disadvantages attaching to the treatment of malignant cholera-collapse, at that time amongst the poor at their own inconvenient abodes.

When we take into consideration the difficulty of determining with any approach to accuracy, the proper density of the fluid to be introduced into the altered blood of cholera patients, without risk of the injury to blood-corpuscles, and possibly to other elements of the blood ; the paucity of reliable analyses of the blood of cholera patients ; the difficulty in making arrangements in private houses and temporary cholera hospitals, for due preparation of materials ; the imperfection of the injecting apparatus employed, we may justly experience surprise at the number of recoveries which rewarded some operators, rather than at the number of deaths which sometimes succeeded the operation.

Notwithstanding the unfavourable results of my own injections in 1832, I retained a vivid impression of their temporally beneficial effects, and could not avoid the conviction that an agency, capable of beneficially modifying the human organism, even for a short time only, would, after due investigation, be found to possess a therapeutic value.   On the re-appearance of the epidemic in 1848-9, I did not anticipate being enabled to *cure* cholera by venous injections, but that we might be able to save some lives that were inadequately struggling into reaction.

Observation of large numbers of cases of the collapse of malignant or Asiatic cholera shows that, whatever plan of treatment may be adopted, about one half of those who reach this stage do not recover. It may be said of malignant cholera, as of malignant scarlet-fever, or malignant small-pox, that of each hundred cases, whatever be the

plan of treatment resorted to, a given proportion will sink under the disease, a given proportion will recover, and a third proportion will consist of those cases in which the termination in recovery or in death will depend upon the remedial measures employed by the physician. It is humiliating to think, that in the collapse of cholera, until a specific antidotal treatment shall be discovered, the proportion of cases, which the art of medicine can claim to be capable of essentially modifying so as to incline the balance of life in the right direction, appears to be very small. There is a powerful incentive to inquiry, and experiments in the fact that about 50 per cent. succumb, in spite of any treatment hitherto applied.

The greater number of physicians who have resorted to venous injections in cholera, have recommended their employment at a comparatively early stage, before the collapse of this terrible disease had become most intense; and, probably, the larger proportion of recoveries, sometimes witnessed, has followed this practice.

When we compare the results obtained by different observers from performance of an heroic operation, whether it be paracentesis—thoracis, tracheotomy, venous injection, or others, we require to take fully into account the difference in the state of the patient, according as the operation is undertaken at an early or advanced stage of the disorder. These operations are inapplicable before the danger of prompt death from asphyxia, asthenia, paralysis of lungs and heart is imminent. It is probable that whatever of good is realizable from the operation is more readily obtainable before the secondary disturbance of those important organs, which are apt to be involved as the disease progresses, has occurred, and that whatever of ill the operation itself induces, if any, is more readily withstood and overcome when the powers of life are not too far exhausted.

These considerations, doubtless, have often prompted to the performance of operations which are of uncertain permanent benefit, and not themselves exempt from risk to the economy. Until experience has confidently determined whether, and when, in any early stage of disease, any of these operations should be performed; the sole justification, in my opinion, for their employment, is, that prompt death is imminent, that great relief to the patient's sufferings can be afforded, and that life may at least be prolonged with comfort and advantage to the patient and his friends.

At the London Hospital, in 1848-9, owing to the means placed by the executive at the disposal of the medical staff, the zealous co-operation of the then resident officer, Mr. Burch, and the gentlemen, students of the Hospital, some of whose names are attached to the cases, I was enabled, during the progress of the epidemic, to make arrangements for trial of venous injection under favourable circumstances for testing its value, and, in some of the instances, of personally superintending the case throughout all the stages. My first measures, accordingly taken, were to ensure perfect purity of the water employed, such as those of distillation and filtration, and perfect cleanliness of all the vessels employed. The materials,* in solution, were kept, after filtration, in sufficient quantities ready to hand in glass-stopped bottles ; the thermometer employed to indicate temperature of the fluid, during the operation, was applied in the method hereafter described so as to enable the operator, during the whole process of injection, to watch that a proper unvarying temperature was, as far as possible, preserved in the reservoir which supplied the injecting syringe, and lastly, this reservoir was brought as close to the syringe as possible to prevent loss of heat, and, in fact, so attached to the syringe, and above it, as to cause the fluid to find its way into the syringe more by gravity than by suction, and thus diminish the risk of air being drawn into the syringe whilst filling it. For the same reason, instead of employing a syringe furnished with
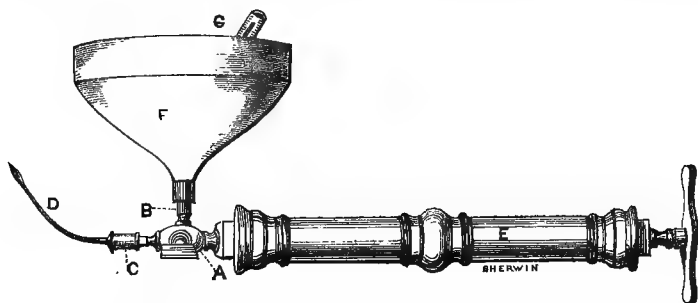
valves as in the ordinary stomach-pump or enema syringes, to direct the fluid out of the reservoir into the syringe, or out of it into the vein, I employed a syringe with a single common cock (A, see diagrams), but with two apertures, one (B) leading to the reservoir,

* See page 145.

and one (c) leading to the vein. A finger-piece or tap was within reach of one hand of the operator, or could be turned by an assistant, which when turned as required, enabled the fluid to pass from the reservoir into syringe, and thence into vein, as required. The tube (D), introduced into the vein, was attached *immediately* to the cock. Thus, as the accompanying woodcut shows, all connecting tubing, and unnecessary junctions were dispensed with.

The body of the syringe (E) was formed by an ordinary thick-walled brass anatomical syringe, capacity of about two ounces, well tinned inside. The conical reservoir (F) was made of brass, silvered within, and thickly coated outside with caoutchouc to render it a non-conductor of heat. I found the thickness of the metal, of which a good anatomical syringe is made, was not easily cooled down. I should have covered this also with caoutchouc, but that I preferred the operator, holding the syringe, should be able to feel any accidental considerable change in temperature of contents. Lastly, (G) represents a small mercurial thermometer, the frame constructed of ivory only, placed in the reservoir, and, consequently, always under the eye of operator and assistants. I may mention the fact, that in all the successful cases, the improved apparatus, with the precautionary measures described, were employed. Some of the unsuccessful cases were injected before I made the improvement described. I am here writing from memory only, so let the statement stand for what it may be worth. I may mention, that in 1832, I employed the same anatomical syringe, but with two one-foot lengths of elastic wire-wove varnished tubing, the use of which preceded the introduction of caoutchouc tubing, to connect the syringe with the vein, on the one hand, and with the common basin containing the fluid to be injected, on the other hand. In anticipation of the epidemic of 1848, I provided myself with an apparatus similar to Blundell's Gravitator for passing blood into a vein (*see Lancet circa* 1828), but discarded it in favour of that which I constructed as above represented. I had a sufficient hint in 1832 of the importance of taking extra precautions against injecting air into the vein, in finding in one *post-mortem* a larger quantity of air in the heart than was *satisfactorily* explicable as an orthodox necroscopic phenomenon, one at least said to be sometimes met with in death from cholera when venous injection has not been resorted to.

In passing, I may recommend my venous injection apparatus to obstetricians called upon to inject blood into the veins. It would require to be of much smaller dimensions than for cholera salino-alcoholic injections.

It will be observed that the construction of the above injecting apparatus necessitates employment of time in turning successively the tap, in watching that it is correctly turned in order that the stream be not drawn out of the vein instead of from the reservoir, and in noting the temperature of the fluid, and in watching the effect of the introduction of the first ounce, and succeeding ounces of the fluid. This occupation of time is highly important and beneficial, as it ensures a slower and more gradual injection of the fluid. I am persuaded that great errors have been committed in too rapid injection, and also in the injection of much too large a quantity of fluid. It was at first difficult to resist introduction of too large a quantity; the primary beneficial influence of one or two pints was so surprising, and so promptly perceived, that the physician was, I believe, often tempted, under the influence of a well-known physiological fascination, to pour in pint after pint, to a dangerous and fatal extent. *Medio tutissimus ibis* is true in this as it is in the application of many ordinary therapeutic agents. It will be observed that in two of the successful cases, comparatively moderate quantities, were injected.

CASE I.—Malignant cholera.—August 15th. Seized 11 A.M. with diarrhœa, vomit, cramps, absence of urine.

Three P.M.—Admitted in collapse.

Six P.M.—Injection.   ℥lxx.

Second injection attempted. Death without temporary rallying.

C. F. C., aged 40, coppersmith, Mile End New Town, admitted at 3 o'clock P.M., August 15th. Extremities cold and livid, skin corrogated; pulse at wrist barely perceptible; tongue cold; temperature about 85°; voice husky; features shrunk; eyes sunken.

States that he was suddenly seized at 11 A.M., with purging and vomiting, attended with some cramps; since the seizure had not passed any urine, complains of pain, and a sense of constriction over the chest and præcordium.

The remedies immediately exhibited were: Ammon. sesqui.-carb.

gr. iij. Murray's solution of Camphor ℥j. every half-hour. Cataplasms of mustard with turpentine and vinegar over the chest and abdomen. Epithem of turpentine and vinegar to the lower extremities, which were at the same time freely rubbed with a coarse cloth. Iced drinks were given to allay the insatiable thirst.

At six o'clock he was seen by Drs. Cobb and Little, when he appeared to be fast sinking into a state of hopeless collapse. Under their superintendence the mid-basilic vein was injected with the saline solution to about seventy ounces.

A second injection was soon after attempted, but he rapidly sank.

CASE II.—Malignant cholera. Saline injection with alcohol ℥cclxv. Death.

August 17th, 8 A.M. Attacked in abdomen by pains and cramps. Noon.—Admitted into Hospital in collapse.

One P.M.—Injection into veins, ℥lxxx.

Half-past four P.M.—Re-injection, ℥lxxiv.

Five P.M.—Small quantity of urine passed, about ℥iss.

Eight P.M.—Re-injection, ℥cx.

Quarter past eleven.   P.M.—Death.

Joseph Wood, aged 26 years, a clerk, was bought to the London Hospital on August 17th, 1849, and there left without friend or relation to give any account of the attack. States that about 8 A.M. he was suddenly seized with violent pains, chiefly in the abdomen and legs, though occasionally the cramps extended to the arms; constant vomiting and purging, quite unable to attend his duties, and when so discovered by his master, was brought to the Hospital about 12 o'clock. He was cold, both surface and tongue; pulse scarcely perceptible, severe cramps in the legs and arms; violent pain of body; nausea, but no vomiting; hands shrivelled, of a dusky blue colour; face of an ashy paleness; voice a mere whisper; intellect perfect; ordered Murray's solution of Camphor, with Ammon. sesqui.-carb. g. v. About one P.M., when quite pulseless, an injection of eighty ounces of warm water, temperature 115°, Fahrenheit, was thrown into the median cephalic vein; the water contained the usual quantity of salts and alcohol. The skin directly became warm, the pulse regular, 120 per minute, the patient to speak distinctly; lips became red, instead of livid; the temperature under the tongue 90° Fahrenheit, instead of 85°, at which it was previously.

Three P.M.—Passed an immense rice-water dejection to the amount of

fifty ounces; the pulse rapidly diminished in strength; but increased in freqeuncy up 160 beats per minute.

Half-past Four.—Vomited for several minutes; pulse imperceptible at the wrist, scarcely perceptible in the arm; had ℥lxxiv. of fluid injected, when he again improved in every respect, and a few minutes past five P.M. he passed a small quantity of water, about three table-spoonfuls.

Eight P.M.—Rapidly sinking, quite unconscious, and apparently without pain; was again injected to the amount of 110 ounces which partially revived him. He spoke French fluently, and muttered about the pleasures of Vauxhall, but never recovered his consciousness.

Ten P.M.—Pulse very small and very quick; surface cold, and bathed in cold sweats; countenance ghastly.

Eleven P.M.—Pulse a mere flutter.

Quarter past Eleven. Died without a struggle.

We have since learned that he was a man of very intemperate habits.

CASE III.—*August,* 1849.—Malignant cholera, preceded by constipation, provoked by a calomel and colocynth pill. Two injections of saline alcoholic fluid; the first of ℥xl, the second of ℥xxx. Death within twenty-four hours after seizure.

Miss J., aged 21, previously chlorotic, living in a house almost surrounded by one of the numerous streams at Stratford, Essex, which leaves at every tide mud-banks largely exposed, attended the funeral of her aunt who died of cholera. At bedtime the same evening, the bowels having been for some days confined, such being her habit, she took a calomel and colocynth pill. On the following morning she was disturbed by the action of the pill; the looseness, however, did not subside after the ordinary action of the aperient pill, but, on the contrary, at 9 A.M. the purging and depression of strength were so violent, accompanied with occasional sickness, as to cause apprehension of cholera.

I visited her at noon when I found her prostrate, cold, almost pulseless, without much discoloration of surface, indifferent to surrounding objects, but capable, when aroused, of giving the above history of the commencement of her illness; occasionally cramped.

The pill had been administered by her father, a manufacturing chemist.

The plan of treatment, the particulars of which I am unable to remember, consisting, I believe, of small doses of calomel and opium, with

draughts of camphor, æther and ammonia, which had been commenced by the gentleman already in attendance, was recommended to be continued.

I revisited her at six P.M., collapse was then complete; pulselessness; livid pallor of face; deeper discoloration of extremities; extreme coldness of surface and tongue; greater difficulty of arousing her; respiration, heaving unfrequent; death apparently near at hand.

Between seven and eight, P.M., she was injected with usual saline alcoholic fluid, ad ℥xl. The pulse returned at each wrist, the face and surface generally became warmer; she expressed herself better, especially that she was relieved from the oppression of breathing, and from the epigastric pain. She also vomited once shortly after injection. She was advised to take diluted wine, milk-and-water. External application of warmth to be continued.

Before eleven, P.M., she had relapsed into collapse. Looseness of bowels returned. I ordered immediate re-injection, and regretted that it had not been earlier repeated. The obstacles to resort to venous injections in a private house were apparent; notwithstanding the patient was in the house and near the factory of a manufacturing chemist (a presumably favourable circumstance), difficulty was experienced in obtaining a proper supply of hot filtered water.

Thirty ounces of fluid were, however, thrown in; again benefit was expressed, the rally was however less marked than at first operation.

Amelioration continued during an hour or more, until after one A.M.; the gentleman in charge of the patient endeavoured to inject for the third time, she sank, however, before completion of the process. The assistants at the operations, and the parents, were convinced that life had been protracted, and relief, with an additional chance of life, afforded by the injections.

CASE IV.—Cholera-collapse; venous injection ℥xxv. Aggravation; death.

A poor Irishwoman, age about 45, fruiterer, name unknown, admitted into London Hospital about noon; she had been to market the same morning.

Admitted in extreme collapse; indifferent, restless, very cold, pulseless and inky; much cramped, skin having the soddened feel peculiar to sudden collapse. The alarmingly rapid progress of the case, and the probability of very prompt dissolution—the whole of the cases admitted into the Hospital about this time having presented extraordinary malignancy—led to attempt to procure reaction by venous injection.

At two P.M. operation commenced; she complained, however, of so great pain in the *right* side of chest, about the seventh or eighth rib, that I caused the operator to desist. Pulse returned feebly to wrists, and some warmth was *communicated*, but the respiration became more difficult; she became insensible, and died about two hours afterwards. The only case of injection witnessed by me in which the condition of patient was aggravated by the process.

Her Irish relatives prohibited *post-mortem* examination.

CASE V.—Malignant cholera.   Saline injection ʒxl.   Death.

August 24th.   Seized with diarrhœa, and vomiting since midnight. No premonitory diarrhœa.

Quarter past six, A.M.   Admitted into Hospital.   Most rapid collapse.

Half-past six, A.M.   Saline injection with alcohol, ʒxl.   No rallying.   Death about one hour after completion of injection.

August 24th, 1849, half-past ten o'clock, A.M., J. W., mariner. No relaxation of bowels yesterday, taken seriously ill at four A.M. (had been drinking spirits and beer until midnight; nose bruised as if during drunken brawl).   Admitted into London Hospital at quarter-past six, fair pulse at that time; very copiously purged; no sickness at any time. Jactitation extreme ever since admission until last half-hour. At present, colour very dark everywhere; coldness universal; hiccup; pain in left side (sinapism); slight tremor of pulse in left wrist; temperature under tongue 78°.   Respiration 44; moaning; eyes partly open; no motion since quarter-past eight A.M.; condition aggravated every minute; pulsation at brachial and carotid just perceptible; operation of injection by Mr. Reynolds; injection of ʒxl. completed at eleven A.M. Copious perspiration of face and neck; lies easier; colour of lips shade better; temperature of tongue 86°; face less livid. Hands mottled, deep red and mulberry; slightly stupid ten minutes later; pupils sluggish.

Previously to operation one drop of thick black blood oozed from the arm; at the conclusion of operation half-an-ounce of dark but thinner blood escaped.   Death about an hour afterwards.*

* A case of cholera unsuccessfully injected at London Hospital, in October, 1848, is reported, with the *post-mortem* examination, in the *Lancet*, September 8th, 1849. The author ventures to refer the reader to the notes attached to that case.

CASE VI.—Malignant cholera.   Saline injectious with alcohol, 250 ounces.   Recovery.

August 12th, 1849.—Diarrhœa and vomiting.   Admitted into Hospital 13th in complete collapse.   Urine absent before noon on August 13th; secretion restored, August 15—16.

14*th.*—Five, P.M.; saline injection with alcohol ℥lxxx.   Eight, P.M.; re-injection ℥lv.   Midnight; re-injection about ℥lxx.

15*th.*—Eight, P.M.; re-injection about ℥xlv.

22*nd.*—Quite convalescent.

Remained in Hospital under observation a month.   Cured.

August, 1849.—B. P., aged 22, seaman, recently arrived in packet ship Victoria from New York, where at his departure, cholera prevailed, since resident near the river, was attacked with diarrhœa on 12th, succeeded by urgent vomiting, increased purging, and prostration. On Monday 13th, at midday, he was admitted into London Hospital under the care of Dr. Little, on Monday at five o'clock, cold and pulseless, urine reported absent since the morning. A single draught on admission containing a few drops of laudanum and æther, and one five grain dose of calomel, succeeded by smaller doses, were the internal remedies resorted to, his condition nevertheless became aggravated; and on afternoon of Tuesday 14th, report was made to the effect that no pulse had been distinguishable in radial or brachial arteries, and no urine passed since admission; the inky blueness of face, hands, and feet greater than in many fatal cases of Asiatic cholera, presenting with the sunken eyes, feeble, almost inaudible voice, and indifference to surrounding objects, with the cold, damp surface; the tongue at 82° F., and the sluggish, rare, thoracic heavings, as profound* a case of collapse as ever

* The intense symptoms of collapse which rapidly succeed the onset of cholera, should be distinguished from that profound collapse, observed a few hours later, when death is thus postponed. The accession of symptoms of collapse is often followed by transient returns of pulse and warmth, even in the cases ultimately fatal. A disproportionate degree of danger is sometimes attached to first symptoms of collapse. The suddenness of invasion and rapid development of the symptoms temporarily overwhelm the system, reminding the observer of the phenomena exhibited on sudden profuse fatal hæmorrhage, viz.: rapid syncope, sometimes immediately fatal; at other times, partial rally, return of syncope, the condition of the patient fluctuating so long as life remains. The points of analogy between cholera-collapse and that from hæmorrhage may be carried farther than the dissimilarity in the external appearance of the sufferers from these conditions would indicate. At the outset of collapse we should never despair of saving the patient

witnessed. Some hours previously vomiting and purging had ceased. Distressed and humiliated, as must be every physician who is doomed daily to witness the inefficiency of art to rescue from death a cholera patient in the prime of life, apparently of naturally robust constitution (with the aged or previously diseased subjects of cholera the medical practitioner may become reconciled to succumb in the contest with death), I resolved, after my colleague Dr. Fraser, and Mr. Burch, the resident medical officer, had agreed in pronouncing the case hopeless, to afford an additional chance of life by resorting to injection into the veins of a mixture of saline fluid with alcohol.

The ingredients used were, Sodæ Hydrochloratis, ʒij.; Sodæ Sesquicarb., Əij. Aquæ distill., ʒcxx., carefully filtered, and subsequently heated. To each imperial pint (ʒxx.), immediately before injection, at temperature of 110° to 115° F., two drachms of alcohol were intimately mixed by stirring. The injecting tube was introduced by the right median cephalic into cephalic vein (the patient taking no notice of the incision of the integuments, and the early steps of the operation), and the fluid gradually impelled onwards. After introduction of about ʒxx. the respiratory movements were observed to be more frequent. After a longer pause than that observed after each syringeful of about ʒij. was propelled,

by the employment of diffusible stimuli, external warmth, internal warmth by enemata, maintenance of recumbent position as far as practical, sinapisms to chest and abdomen, and energetic frictions to the general surface, not forgetting to comply with the natural craving for diluent cold beverages. But profound collapse, of hours' duration, although occasionally recovered from, probably owing to previous integrity of the more important organs, and consequent inherent vigour of constitution, has been justly regarded as intractable to medical skill. What can rationally be expected in profound collapse, from calomel or other medicines applied to the tissue of the stomach, already almost as inanimate as marble, or as a dead animal-membrane in which porosity remains, but in which capillary circulation and absorption are impossible? Opium is objectionable in large or frequently-repeated doses, *when not rejected by vomiting*, as in the event of reaction it complicates and aggravates the subsequent stage of the disorder.

Post-mortem investigations of cholera show no deficiency of bile in the gall-bladder, so that non-secretion of bile cannot be regarded as cause of collapse, and on this account it is difficult to acknowledge the necessity for calomel during collapse. On the other hand, in the diarrhœa believed to be premonitory of cholera, but which we cannot assert, will, or will not, if unchecked, pass into malignant cholera, the ordinary treatment consisting of calomel with opium is, upon all rational ideas of pathology of diarrhœa, advisable; moreover, it may be prudent to use it even if superfluous, since so large a number of observers speak favourably of it.

L

other ℥xx. were thrown in—still no rapidly perceptible change in patient's condition. On inquiry whether the process was painful, he said, " it felt warm," that " it gave him no pain." Once he mentioned that it felt " hot,"and applying left hand to chest said that he felt "better." After about ℥xxx. were thrown in, the pulse was perceived comparatively *full* at the wrists and temples ; it was now evident that the stream had not merely reached the right side of the heart and the pulmonic circulation, but that it had permeated the lungs, and had attained the left side of the heart and the systemic circulation. The effect of the continued injection was carefully watched; after about ℥lxxx., containing one ounce of alcohol, had been introduced, the expired breath was believed to be warmer ; patient, when asked, continued to express himself relieved, and a few fine drops of perspiration were noticed on the lower part of the forehead. The process of injection was now discontinued. Shortly the colour of the skin above the eyebrows improved, a dingy red taking the place of the inky blueness, the cloud of darkness disappearing upwards, the redder hue superseding it, succeeded in a short time by distinct return of warmth in the forehead. The pulse beat softly and full at 88 ; respiratory movements more complete; expression of face improved, although colour of this part was still dingy; eyes less depressed ; voice clearer. Ordered weak wine-and-water or milk-and-water, cold or tepid at pleasure ; warm bottles to feet and legs.

At half-past six P.M., it was evident from the steady character of pulse, the gradual increase and persistence of warmth, the improved colour of surface, and general expression of improvement, that the injected materials had not merely, by their chemical composition, affected the colour of the circulating fluid, or raised the temperature by imparting the contained caloric, as the quantity of disengageble caloric in eighty ounces of injected fluid, was clearly insufficient to maintain, during the time that had elapsed since commencement of injecting process, the augmented temperature now observed in the body that previously presented an almost cadaverous coldness. It could not be doubted that the injected materials had resuscitated the capillary system, and the power of generating animal heat.

At eight P.M. other fifty-five ounces ; and at midnight about seventy ounces were thrown in. During the night he occasionally vomited, and purged a black-greenish fluid. On the 15th, it was reported that he twice vomited, and purged the same black-green fluid ; the pulse, colour, and temperature, being maintained nearly the same as throughout the previous evening. Towards night the pulse was again observed to flag, the tem-

perature and colour of the face and extremities to be less favourable; the injection was, therefore, repeated to the amount of about forty-five ounces.

August 16*th*.—Half-past nine A.M.   Is quite sensible, but little sleep during night; complains only of tenderness when epigastrium is pressed; no headache.   Is heavy-eyed, incipient injection of conjunctivæ, colour of surface almost natural, being only slightly purplish; hands cool, feet warm (hot bottles are applied to the feet).   Observed that veins of lower extremities present the natural *fulness* contrasting with the indistinctness of these vessels in the stage of collapse.   Temperature of mouth 93° F.   Tongue moist, coated, slaty-brown, cleaner at edges, no vomiting; two very dark copious fluid motions since yesterday; hiccup after swallowing any article whatsoever.   States, that he voided urine yesterday and this morning with the dejections.   Has had no lumbar pain since the injections into the veins.   Pulse 96, moderate.   Was removed last evening whilst bed was made.   Has taken two pints of milk with half-a-pint of sherry during twenty-four hours.

Half-past seven P.M.—Feels " very well considering."   Hiccup continues; colour good; temperature moderate; tongue feels cooler; occasionally vomits and purges, the former greenish, the latter more yellow.

17*th*.—Half-past nine A.M.   Evidently takes an interest in his his recovery (unlike cholera patients when severely affected) says, " I do not feel so well as I did yesterday; " aspect nevertheless more favourable than last night; slept occasionally; colour and temperature good; forehead warm and soft; no sweat; veins moderately distended; vomited matters stringy; expulsion of matters from stomach and rectum twice, usually simultaneous.   Pulse 72, weak; mouth 92° F.; tongue rather dry, improved in colour.   Has no pain, except at front of elbow-joints, where injections were effected; continues barley-water, iced-water and beef-tea *ad libitum*; medicine recently taken consists of Ammon. Sesquicarb. gr. iij., ex Mist. Camph. ℥ss. alt. quàque horâ.   Milk, one pint; wine, ℥iv. in twenty-four hours.

Half-past four P.M.   Half-pint urine voided apart from fæces.

18*th*.—Appears lower, but states that he feels better; sleeps much; lies quiet, principally on left side with left arm extended; aspect that of convalescent from severe cholera; pain in bowels; colour and temperature of surface good; mouth 93° F.; no hiccup; pulse 72, moderate; tongue brown in middle, clean and moist at sides; anorexia; motion and urine twice.   A purulent discharge has trickled for an hour from right ear.   Capiat. Ammon. ex Inf. Cinchonæ ter die.   Enema consisting of six ounces of Beef-tea every six hours.

20th.—Gradually improved since 18th. Dozes quietly, a large part of day and night. Intellect quite clear; "feels recovering fast;" lies supine; knees drawn up; offensive sero-purulent discharge from both ears, principally from right, quantity diminished. Is rather deaf, colour and temperature perfect. Pulse 84, fuller and stronger; tongue as before; slight sordes about teeth; no sickness; one motion; urine twenty-four ounces; elbows still tender; one drop of pus from one of the incisions in left arm (there were two incisions in each arm, each injection having been effected by a different vein); no inflammation.

21st.—" Well, I feel a little better to-day," he dozes much; pulse 88, strong; tongue and eyes as before; readily takes fluid nourishment; bowels unrelieved; urine more copious; wine intermitted until action of bowels. Haustus Magnesiæ c. Rheo. si opus fuerit horâ-somni.

22nd.—Slept soundly; feels "better than yesterday" complains of right arm, which he bares for inspection; no inflammation; cicatrization slow. Remarked that eyes still appear much sunken; colour of face reddish-brown, probably heightened by former exposure to sun and air. Eyes bright, much less red; pulse 78, full, *quick;* bowels relieved three times without laxative draught. Ordered to be removed into a large airy ward on groundfloor, where other cholera patients are received.

It should be remarked that until this period he had remained in one of a series of small attic wards, originally set apart for cholera patients, where he had been exposed to injurious fluctuation of temperature during the night and day, the thermometer during part of the twenty-four hours exceeding 90° F.

23rd.—Aspect much improved, "feels much better." Less active reaction than that observed in many cholera patients, who have recovered after having taken large doses of opium, or Murray's concentrated solution of camphor. Pulse 78, full; tongue clean, moist, morbidly red and smooth; motions fæculent, three since yesterday; urine free.

24th.—Sitting up in bed, " quite well, except weakness;" says he has enjoyed a good basin of bread-and-milk since 22nd. Pulse 80, full, soft; respiratory movements 18, full; temperature of tongue 97° F.

From this date, the tenth after the operation, he rapidly improved. On fourteenth day he was removed into the ordinary clinical ward, and permitted to dress himself; at this period the incisions into the arms, each of which was about half-an-inch in length were healed. The looseness of bowels had quite subsided. He was now allowed a mutton-chop daily, in addition to milk, arrow-root, beef-tea, and three ounces of wine.

On 21st day after the injections, he considered himself perfectly well,

and was enabled to take exercise in the garden of the Hospital. All the functions appeared perfectly entire. It should be mentioned as a proof of the nearness of dissolution at the period of the injection, that although at that time he rationally answered questions in the indifferent manner, and husky, almost inaudible tone of cholera-collapse; he has at present no recollection of having felt the incisions into the arms, or of any of the subsequent steps of the operations. He has never had the slightest cough since the injections.

January 19th, 1850.—The subject of this case has since revisited the United States; I have seen him, he is in perfect health, and has had no indisposition since he quitted the Hospital. At this visit he asked for and obtained from me a certificate of his having been the subject of venous injection, which he was desirous of exhibiting to the Medical staff of a Hospital at Charleston, U. S., to whom he had mentioned his case. I hope my Transatlantic brethren may have survived the late war, and can recall the man to their memory.

Attached is a report received from Dr. Letheby concerning an analysis of urine passed on two occasions by this patient after saline injections into the veins.

August 23rd, 1849.

DEAR SIR,—I have only at this moment completed my examination of the urine of your cholera patient, and the following is my report thereof:—

	Urine voided on the 17th.	Urine voided on the 18th
Quantity voided	ʒvss	ʒvj. and ʒv.
Appearance	dirty-brown turbid liquor, looking like broth	clear amber-coloured liquid.
Odour....................	putrid, and very offensive ..	not peculiar.
Deposit	copious of triple phosphate	..slight mucous.
Specific gravity	1016.4	1012·8.
Reaction to test-paper	very alkaline	acid.
Albumen	not present	not present.
Sugar	not present	not present.
Solid matter in 1 fluid ounce	6·6 grs.	10·2 grs.
Of which alcohol dissolved..	3 grs.....................	4·7 „
Solid matter in 1000 grs.....	13·5	20·8 „

Per-centage composition of the Solid Residue.

	17th.	18th.
Urea	0.56	36·21.
Uric acid	1·29	2·30.
Extractive matter and mucus	54·20	30·56.

	17th.	18th.
Alkaline sulphates	30·31	16·61.
Alkaline chlorides	·72	a truce merely.
Alkaline phosphates	4·35	10·28.
Earthy phosphates	7·57	4-12.
	99·00	100·08.

In the case of the urine voided on the 17th, the alkaline salts were chiefly ammoniacal compounds; for 100 parts of the solid residue only yielded 16·2 of ash, whereas 100 parts of the solid residue of the urine voided on the 18th yielded 30· parts of ash.

The results of these inquiries indicate, as in the former cases, the presence of an enormous amount of extractive matter, of a great quantity of alkaline sulphate, and of a more than ordinary proportion of phosphates. You will observe, moreover, that the quantity of alkaline chlorides secreted by the kidneys is most remarkably small. This fact is the more surprising when we consider how large a quantity of salt had been injected into the blood-vessels of your patient. I regard it, therefore, as a strong indication of a great deficiency of saline matter in the serum of the blood.

A comparison of the urine, voided by your patient on the 18th, with that passed by him on the 17th, showed a decided improvement in the general character of the secretion; for the extractives and sulphates are considerably diminished in quantity, and the urea and uric acid are much nearer to the normal proportions. I regret that I did not, in my former examinations, make any search for the alkaline chlorides; I shall, however, in my future investigations, make this a special point of the inquiry; and I shall take the means of the analysis made by Berzelius, Simon, Lehmann, Dumenil, Becquerel, and Marchand, and consider that the solid matters of the healthy urine yield 10·34 per cent. of alkaline chlorides. It must, however, be always borne in mind, that the nature of the food and drink taken will somewhat modify the proportion, and hence these observers have noticed variations in the amount of chloride from 4 to 25 per cent.

I have drawn up this report in great haste, but I trust that the facts are sufficiently clear for your purpose, and that you will be enabled to make a better arrangement of them than I have done.

Believe me to be, yours truly,

Dr. Little.   H. Letheby.

CASE VII.—Malignant Cholera.   Saline injection.   Recovery.
Seized on September 7th, 1849, with dyspnœa.

    „   on September 8th, with diarrhœa.

    „   on September 9th, with vomiting.

Admitted into Hospital on September 11th, in collapse with cramps, not pulseless. Absence of urine from the morning of 10th until 12th, eight A.M.

September 12th, ten P.M.—Still not pulseless, ℥xxx. of saline injection with alcohol ʒiij. thrown in. Injection of additional ℥xv. at half-past one P.M. Oppression at chest sometimes complained of. Convalescent, 17th September. Discharged cured, 24th.

J. T. aged 33, hair-dresser, of West Street, Spitalfields, was admitted into the London Hospital at three A.M., September 11th, 1849, under the care of Dr. Cobb.

He states that on the Friday previous to his admittance, whilst reading; he was seized with difficulty of breathing, which, after a little time, went away; that on the Saturday he was much purged, but without pain; and continued the same until the afternoon of Sunday when he vomited, but was relieved by taking some brandy. On the Monday the purging and vomiting again came on, which was so frequent that it prevented him from doing his business, and in the evening was attended with severe cramps in his lower extremities. As he was becoming worse, he determined on applying at the Hospital, and whilst walking there had occasion to pass a motion.

He also states that a child living in the same house had died of cholera, and that a woman had been attacked with it, but was getting better.

When admitted at three A.M. on the Tuesday, he was suffering intensely from cramps in the thighs and legs, and a gnawing pain all over the body, but especially at the epigastrium; he was purged, and he vomited directly; skin was cold; tongue cold, pulse very small and compressible —thirst extreme (he says that he passed about a teaspoonful of urine on the Monday afternoon); was ordered to take ice and iced-water; a mustard poultice to the epigastrium; and a draught containing chloroform ♏xx., in half-an-ounce of iced-water, to be taken directly.

He continued to get worse during the night—the eyes became more sunken, the face livid. He was, however, purged only once, and at half-past eight A.M. was ordered to take a teaspoonful of brandy in cold water occasionally, and an effervescent draught of citrate of ammonia with an excess of ten grains of the Sesqui-carbonate every three hours; the limbs have been rubbed with turpentine and vinegar.

Ten A.M.—The cramps and gnawing pain having increased, the vomiting become more frequent, and the collapse greater, but there still being a perceptible pulse at the wrist; thirty ounces of a saline solution (composed of one drachm of chloride of sodium, ten grains of sesqui-carbonate of soda, and an ounce of distilled water, which was diluted by two pints of distilled water at the temperature of 115° Fahrenheit, and to which was added half an ounce of alcohol) was injected into a vein at the bend of the right elbow.

The pulse immediately before the operation was 76, very small and compressible; the temperature beneath the tongue 89° Fahrenheit, and he was continually moving about in pain; but, during the injection, which occupied about a quarter of an hour, he gradually became quiet; the pain and cramps left him, and, at the close of the operation, he said he was quite well, and should like to get up, he also talked freely, and on being questioned said he felt as if he had been drinking; the pulse rose to 88, more distinct, and with greater power; the temperature beneath the tongue was 91° Fahrenheit, but there was no appreciable difference in the skin.

He remained quiet for about a quarter of an hour, but then vomiting came on, and he began to throw himself about, complaining of great oppression at the chest with intense pain and cramps, and altogether was much worse than before.

He continued nearly in the same state, but if anything more quiet, until half-past one P.M.,—when fifteen ounces more of the saline fluid were injected into the vein in the left arm. After this he became more comfortable, the vomiting was less urgent, as also the pain, &c., and he appeared to doze for a short time.

Eight P.M.—Has been quiet and has slept a little, but complains of pain in the left side and back, which (he says) prevents his remaining in one position for any length of time. Auscultation of chest presented no explanation of pain or dyspnœa; has passed no urine during the day, nor has been purged since half-past eight A.M.; the friction has been continued; has taken three ounces of brandy during the day, and six quarts of iced-water, besides a large quantity of ice, portions of which he has had continually in his mouth.

September 12th, half-past eight A.M.—Has slept a little during the night and remained perfectly quiet, having only vomited once, and that a short time ago—the bowels were opened at half-past four, the stool being less liquid, and of a yellowish colour, at the same time he passed about a tablespoonful of urine (so he states); tempera-

ture beneath the tongue 88° Fahrenheit; tongue and skin warm; has taken some iced beef-tea, and three ounces of brandy during the night; pulse 96, fuller and stronger.

One P.M.—Pulse 102, full—tongue warm, bowels open; at half-past eleven A.M., stool had consistence of gruel.

At half-past two P.M., he vomited some water tinged with bile; after which he was relieved, and slept during the afternoon.

Eleven P.M.—Has passed urine twice since the morning (altogether about twelve ounces) complains of pain in the head, and in the feet and legs, but none in the epigastrium, pulse 96 full, and soft; skin warm; tongue warm and moist; eyes less sunken.

13th.—Bowels opened twice during the night, and he was also sick, feeling of heat about the head; pulse 96; to have an enema of ten ounces of beef-tea every four hours : to take Mist. Chlorinata (Chlorat. Potas. and Acid. Hydrochl.) every four hours, and to omit the effervescent mixture.

Eleven P.M.—Bowels have been opened four times during the day, the stools being of a ginger colour, thin and very offensive; temperature beneath the tongue 88, upper surface feeling cold; skin cool; has vomited some greenish liquid; complains of a sensation of tightness about the chest, and that the wine (four ounces of sherry) has given him a pain in the head.

September 14th, ten A.M.—Has slept pretty well during the night; pulse seventy-eight, fuller and stronger; has passed a motion containing a large quantity of bile and of more consistence; has passed his urine this morning, and vomited some more greenish liquid; tongue brown and rather dry; lips moist; complains of uneasiness over the body.

Six P.M.—Has been pretty comfortable during the day; tongue moist and white, but very dry on awakening; has vomited but little, and that only water slightly tinged with bile.

Ten P.M.—Complains of oppression about the chest, which, however, is not continual. This was relieved by a mustard poultice, otherwise much about the same; to continue the injections of beef-tea, and to take also iced beef-tea and arrow-root.

15th.—Ten A.M.; was uneasy during the first few hours of the night, but during the last four has been quiet; complains of a sense of oppression at the chest, at the same time the respirations are very easy, from twenty to twenty-four in a minute. This feeling was followed by pain in the head, and a feeling of being (as he calls it) light-headed,

but not delirious; bowels open once during the night; pulse 76, weak, temperature below tongue 94° Fahrenheit; skin cool; tongue moist; no injection of the conjunctiva.

Eleven thirty-five P.M.—Feels better, bowels have been open four times, and urine has been passed freely; skin cool; pain in head and chest less; pulse 76; not so feeble; to leave off the injections.

16th.—Twelve A.M.; has passed a comfortable night, but complains of feeling feverish without having any apparent symptoms of the kind. (This may be accounted for by his having been reading for some time.) Pulse 72, stronger; temperature below the tongue 94° Fahrenheit; continues to take three ounces of sherry daily, and also beef-tea, everything being taken cold.

Ten P.M.—Breathing regular; very quiet; pulse 72; complains of no pain.

17th.—Has passed a comfortable night; bowels acted upon daily; stools containing a large quantity of bile. He was very comfortable during the night.

18th.—Complains of being very hungry; was allowed to take some bread-and-milk for the first time.

19th.—Being much better was allowed some boiled mutton for dinner, and a half-pint of porter instead of the wine; bowels are acted upon regularly every morning; allowed to walk about the ward.

21st.—Appetite better in all respects, very much improved; to have full diet.

22nd.—Has continued to take the chlorine mixture to this time, but is now to take decoction of cinchona ℥j. three times a-day; complains of weakness in the knees, and of the calves of his legs, being swollen towards night, otherwise very well. He was a "nervous" person, apt to observe anxiously every passing change. The pain in his legs was simply due to renewed use of them.

24th.—Being quite well was discharged this day.

W. HOLMAN.

19th *January*, 1850.—I have seen this man within a month, he was in good health.   W. J. LITTLE.

CASE VIII.—Malignant cholera. Salino-alcoholic injection ℥xl. Absence of urine seventy to eighty hours. Recovery.

T. F., aged about 50, apparently a vagrant, blind four years, was admitted into London Hospital, under care of Dr. Little, August 27th,

1849, at eleven A.M., in a state of incipient collapse; a scruple of calomel was immediately administered by Mr. Burch, the resident medical officer, succeeded by two grain doses of same medicine every hour during eighteen hours. At the expiration of this time, "as no improvement had taken place, but on the contrary, the stage of collapse having much advanced," he was injected with the usual (see p. 145) saline alcoholic injection to the amount of forty ounces.

The substance of the above particulars was given me by Mr. Burch. Although not present during injection, I occasionally saw patient before and after the operation. I regarded it as a severe, but not excessively rapid, case—severe as regards the dose of cholera without much attempt at reaction, as indicated by cramps, active vomiting, and partial return of warmth. I expected the man would die, although he had rallied after the injection. Many hours after the injection, his condition being distinctly improved by that operation, he remained without much alteration.

August 30*th*.—Finding that the clinical clerk, who took the early notes was compelled to leave the Hospital, I henceforward made notes of his progress.

August 30*th*, 1849.—Feels better; quite sensible; appears anxious concerning recovery; temperature under tongue 86; in axilla 96; colour good; is still rather restless. Two motions since last night, more fæculent; no blood. (Blood had previously passed by stool.) Pulse 96 distinct, small; skin soft; respiration 32, complete. Recollects operation, but does not "know whether the doctors took blood out or put any in." Tongue whity-brown, moist. Pain in loins relieved by dry cupping. Abdomen still tender. Hot-air bath has been frequently applied, and has had injections of beef-tea per anum. Takes wine-and-water, weak brandy-and-water, beef-tea, milk-and-water. No medicines.

Seven P.M.—Better; pulse 90, fuller; tongue drier; no urine yet passed; respiration 32. Another motion without blood.

31*st*.—Supine; knees drawn up; avoids contact of hand with abdomen; apparently asleep. Forehead moderately warm; colour good, offering striking contrast to his former condition. Tongue dry; eyes still much sunken, (perhaps partly attributable to atrophy of eyes from blindness); pulse 96, stronger and fuller; three fæculent stools; urine twice, first time to extent of ℥iij., and second time ℥viij. Discontinue beef-tea injections.

September 1*st*.—Still supine; knees drawn up; coughs occasionally;

temperature and colour good; pulse 90; febrile fœtor perceptible; one motion; urine twice; tongue dry and brown. Diet: milk, beef-tea, wine-and-water, yolk of an egg. Abdomen tender, doughy.

3rd.—Going on well; sleeps much, principally supine; turns on side three or four times daily; extends the legs; coughs occasionally (no rhonchi have been perceived); pulse 84, quick; tongue dry. Bowels relieved three or four times daily, dark brown. Urine copious, and colour natural. A small sore between scrotum and thigh from continued contact. Takes saline mixture. Wine ℥ij. to ℥iv. daily. Milk, egg, boiled bread, arrow-root.

4th.—Appears to be going on favourably; " feels queer all over," explained to mean headache. Pulse 84, soft, full; tongue moister. Motions and abundant urine two or three times a-day. Supine; knees quite extended. No abdominal tenderness.

5th.—Sometimes requires rousing to take food; passed a good night; eyes still sunken; "feels better;" coughs occasionally; tongue red in centre and dry; moist at edges. Beef-tea as before. Complained of pain at knees; on examination they were found to be excoriated at the points from long-continued contact of bedclothes whilst lying supine with knees drawn up.

6th.—Sits up in bed to take meals; "enjoys food; tongue moist and red; bowels not open; still coughs occasionally. Haust. Rhei c. magnesia si opus fuerit.

10th.—Going on same, steadily; appetite good; mutton since 7th. Pulse 72, moderate. Bowels moved generally twice a-day. Tongue natural.

15th.—Sitting up, walked to fireside. A trace of cough. In answer to questions, says he has pain from side to side of chest. Nothing to corroborate existence of this pain ascertained by auscultation or percussion. Bowels, tongue, and urine natural; pulse 120, weak (sitting upright); respiration 30. Appears flurried.

Although evidently weak at the period of last report, and incapable of remaining long out of bed, he rapidly gained strength. During convalescence he became noisy, disobedient, rude to the female attendants, and was finally dismissed in consequence of his misconduct. He was apparently quite restored.

CASE IX.—Cholera collapse; recovery. Otorrhœa during recovery from cold stage.

This case is appended to show that the otorrhœa mentioned in

Case VI., p. 147, was probably an accidental circumstance, and not dependent upon the venous injection. It is probable that the puriform discharge from the ear is a consequence of the profound blood stasis of the cold stage. This man also suffered much from hiccup—a troublesome symptom in one of the injected cases.

Reported by Mr. Brushfield.

G. T., aged 37, a native of North Shields, by employment a sailor on board a collier, admitted into the London Hospital on Tuesday, November 15th, 1848, at four P.M., under the care of Dr. Cobb.

He left North Shields about five weeks ago, and arrived in about a fortnight in the Thames, where he has been at work ever since.

On Sunday morning, November 13th, about half-past two, he was suddenly attacked with headache, vomiting of about a pint of black fluid, purging, and cramps in the abdomen, causing "great lumps" to appear there; the captain gave him some tincture of rhubarb and peppermint without affording relief; on this day he vomited about forty times, the vomited matters being for the first three or four times black, afterwards becoming clear, like water. The stools at first were of a "dark-grey" colour, afterwards becoming like rice-water; the number of motions were about twenty, but there is a great doubt whether they were not more than this, because, he stated himself, that he kept going to the closet "nearly every two minutes." He passed a very small quantity of urine during the course of the day. The cramps came on occasionally very severe. He was constantly drinking cold water to allay the "dryness" of his inside, and also the burning pain at the pit of the stomach.

On Monday (November 14th), all these symptoms continued, with the same urgency, except that he was not purged quite so often, perhaps only about thirteen or fourteen times, according to his own statement; the stools being of the same rice-water character, and also passing no urine whatever during the course of the day.

This morning (November 15th), the same symptoms continued. He did not vomit quite so much, but the vomited matters and stools were of the same character as yesterday, and no urine has been passed.

Since he has been attacked, he has had no sleep, but has dozed occasionally, and has also felt extremely cold the whole time.

On his admission at four P.M., the surface of the body was cold; legs and feet bluish; face of rather dusky hue; eyes sunken; temperature under the tongue 86°, and vomiting of a dark coloured fluid (he had

drunk some coffee not long before he came to the Hospital). Complained of tenderness over the abdomen, no tumour above the pubes. *Ordered*—hot water-bottle to his feet. Hot-air bath. Mustard poultice to the abdomen. Calomel gr. ij. every hour. And to allay his constant thirst, ʒj. of brandy to ʒxx. of water.

Quarter-past six.—Has had no cramps since his admission. Surface of the body much warmer. Has vomited some clear fluid mixed with some opaque shreds. Has voided by stool about an ounce of a reddish fluid. Pulse can be felt distinctly.

Dr. Cobb saw him. He had a motion at eight, and another at nine, the former being of a light-brown, the latter rather darker, both were fluid. At nine he had an enema of ʒj. of Laudanum to a pint of warm water. Has had no vomiting, and but little or no pain in the abdomen since he had the mustard poultice. Pulse 82, small and weak. Temperature under the tongue,87° Feels very comfortabe. *Ordered*—To omit the calomel. To have beef-tea. Ammon. Carb. gr. iij. Liq. Amm. Acet. ʒj. every two hours.

November 16*th*.—Half-past eight. Has had no vomiting or purging. An hour and a-half ago, he passed about a pint and a-half of rather turbid urine. Dozed frequently during the night. Is not quite so thirsty as he was yesterday. Pulse very weak and feeble. Has taken about a pint of beef-tea.

Eleven.—Does not complain of any pain. Since the last report he has only called for some drink once. Legs are warm, and have nearly resumed their natural colour. Is very dozy.

Four.—Voided by stool about a pint of very thin, dark, bilious matter, without any solid material in it. Has had no vomiting or purging.

Ten.—Has dozed a good deal. Pulse can be felt more distinct. No vomiting or purging. Feels rather chilly about the legs and feet, notwithstanding that he has the hot-water bottle.

November 17*th*.—Half-past nine.—Voided about half-a-pint of pale urine at eleven o'clock last night, and again at three this morning. Pulse more evident. Had a very restless night. Hands cold. Feels very thirsty yet, and also fancies he could eat some solid food. Tongue clean and moist. Complains of a little soreness of the abdomen.

Quarter to ten P.M.—Has voided more urine. Has a little uneasiness in the abdomen, but has not vomited or been purged.

November 18*th*.—Eight. Had a little vomiting at eleven last night; voided urine twice during the night. Had a motion this morning at

four o'clock, which was yellow and partly solid. Was restless during the night, but not so much as the night previous. Thirst still continues. Still has pain in the abdomen. Pulse small and weak. Has had hiccups for a short time this morning. Mist. Camph. ℥j. Æth. Sulph. ℳ xv. statim.

19th.—Three P.M.; Hiccups have entirely left him. Voided urine twice since the morning. Has vomited some greenish-looking matter. I was unable to see him during the course of the day, but the nurse stated that he had had one partly solid motion, and passed water three times. Had some lemonade during the course of the night. The left ears discharged a little during the night. Ordered rice-pudding.

20th.—Had very little sleep during the night, in consequence, he states, of the pain through both ears; there is now a slight purulent discharge from the left one. The nurse states that he is very much flushed at times. One of his relations came to see him yesterday, but he did not recognise him for a considerable time. He says he feels very stupid at night, and as if he were at work on shipboard, and strange things often appear before his eyes; had never anything the matter with his ears until his present illnesss. Passed water several times during the night and this morning, but he has not vomited, nor have his bowels been open since the last report. Has a slight headache, and a little pain in his abdomen. Had some rice-pudding at dinner-time. Is getting tired of the beef-tea. Is very thirsty. Skin warm and dry. Tongue moist and white, red at the apex. Pulse frequent, full, and bounding.

Ordered Mist. Magnesiæ c. Rheo ℥j. statim. To have strong broth in lieu of the beef-tea.

21st.—Has passed a good deal of urine during the night. Slept much better last night. Had pain in the head and much discharge from the ear during the evening. He looks and feels much better. Eyes have resumed their natural prominence. Legs are of their natural colour. Is not so thirsty as he was yesterday. Has a little pain across the abdomen. Bowels have not been opened yet. Has had no vomiting. Tongue clean and moist. Pulse about 80, rather full and soft.

22nd.—Had a motion last evening which was very solid. Did not sleep at all well. Says he has no pain anywhere, and feels much better, and wishes to sit up a little while. Has passed a good deal of urine. Had a little sickness in the morning. Skin warm. Pulse frequent, full, and rather bounding. The discharge from the left ear continues.

24th.—Going on very well.   Only complains of the discharge from the left ear.

28th.—Left ear discharges very profusely, and the right ear now has a slight discharge from it.   Occasional pain in both ears.   In other respects going on very well.   Is able to walk about the ward.   Has a good appetite.

Full diet.

30th.—The only symptom he complains of, is the discharge from both ears, which is getting less.   Feels quite well.

Discharged cured.

When it is considered how few exact observations we possess of the condition of the fluids and secretions of collapsed cholera patients, the value of Dr. Letheby's communication (p. 149), cannot be overestimated.   I regret that his previous communications on the urine of cholera patients, alluded to by him, were only verbal, and cannot be quoted here.   During an epidemic visitation of malignant cholera, every opportunity of making careful examination into detatched facts should be embraced.   "Time present" should be seized, for, as the cholera visitation is usually sudden in any locality, and alarming in its onset by the number and fatality of the attacks, the physician is apt to be overwhelmed with duties to the sick, and has no leisure to devote to minute scientific investigations.   The duration of the epidemic visitation in any locality is usually limited to a few weeks, and towards its close the cases present a milder and even a different type ; when observations, especially those of a therapeutic character, may bear a different interpretation to that which they might have borne at its commencement.   In the process of time, a sufficient number of exact facts, as to the minute pathology of the solids and fluids in malignant cholera may be accumulated, to enable the future physician to write the pathological history of the disease.

Of the class of isolated facts in the history of cholera, which may hereafter possess an increased value, is one observed by me in 1848, in a fatal case treated at the London Hospital.   The man was admitted in severe collapse passing into reaction.   During the entire period he was in the Hospital, the secretions from the alimentary canal, and from the cutaneous surface were acid.   It is generally understood, that the peculiar rice-water evacuations that constitute the secretion of the canal, immediately before and during well-marked collapse, are

alkaline ; this accords with my experience. In another case in 1848, during recovery from collapse, the secretions were acid. Now, although it is hasty to generalize from so few facts, I am nevertheless of opinion that it will be found, that when the secretion of the stomach, although thin as water, and almost as colourless, are acid, in cholera, the patient has either not attained the intense stage of the disorder, or he has passed through it, struggling into the stage of reaction. I have also remarked, during reactionary efforts, that the matters vomited are less limpid than previously ; they become more viscid, more stringy, as if the exudation of the peculiar cholera rice-water flaky secretion, consisting of the albuminous alkaline and saline matters of the blood, were giving place to the ordinary secretion of the gastric mucous membrane, a more normal secretion succeeding to the characteristic abnormal exudation of cholera. This, at first sight perhaps unimportant matter outside of its pathological interest, may assist during the progress of the case in determining in which direction the case tends.

Careful observation by the unaided senses, as well as with microscope, determination of specific gravity, and chemical analysis of the blood, as found before and after death, are much needed. A superficial examination of the blood in the large vessels was made by Dr. Letheby and me in 1848, at the *post-mortem* of a patient into whom, after tracheal death râle had set in, 100 ounces of saline-alcoholic fluid had been introduced two hours and a-half before dissolution. His condition was less affected than usual by the operation. When asked whether he felt better, he answered in the affirmative ; said he felt something warm entering him, that " he liked it." The pulse, however, never returned. In fact the operation was too late for the ordinary temporary rally. Notwithstanding the introduction of so large a quantity of aqueous-saline-alcoholic fluid so short a time before death Dr. Letheby concurred with me in inability to detect by superficial examination any difference between it and healthy blood. The lungs were engorged but crepitant, venæ cavæ and pulmonary veins and cavities of the heart were filled with bright-coloured coagulated blood, from which much plasma had separated ; a very different state to the blackened thickened, fluid, " treacly " blood, observed usually, together with an empty contracted condition of the left side of the heart, in such as die in cold stage who

M

have not undergone venous injection. It was obvious from the
above *post-mortem* on the previously injected case, that the injected
fluid had restored the blood as to colour, changing it in the lungs
and heart, from the black tinge of moribund collapse to the bright
hue of arterial blood; that its natural limpidity and coagulability
if not restored by the injected fluid, were, at any rate, consistent with
the presence of the injected fluid in it. It was obvious that the
injected fluid had mixed with the blood in the lungs and heart, but
that the heart was powerless, already too far dead, when the fluid was
injected, to be enabled to forward the mixed blood and injected fluid
into the capillary system. This was proved during lifetime by the
continued absence of pulse, and by the usual amount of temporary
improvement of patient's condition not resulting from the injection.

Notwithstanding the striking results of venous injection some-
times observed, it is not surprising that so small a number only of
these injected have been finally restored. It should be remembered
that a very small proportion of those at any period *completely* col-
lapsed recover under any mode of treatment. It is an anxious
moment when determining whether the patient is bad enough to
justify operation, and not too far dead to render it useless. Cer-
tainly (as the case above alluded to shows) it is useless to inject
after tracheal râle has set in. But tracheal râle does not commonly
precede death in the cold stage, the patient more often sinks silently
without even a breath-struggle. The system has been too much
emptied of its fluids, by the abundant vomiting and purging, to afford
sufficient fluid in air-passages to engender tracheal râle by the pass-
ing air.

It has been objected to the employment of venous injections,
that the principal danger in cholera does not arise from the amount
of fluid evacuated, but from the depressing and otherwise noxious
agency of a morbid poison. In some cases, undoubtedly, death
occurs without copious discharges from the alimentary canal. But
nobody can watch the alarming collapse which sometimes instantly
supervenes, upon even a single copious simultaneous discharge from
both stomach and rectum, without being convinced that in the majority
of cases, abundance of discharges unquestionably aggravates the
tendency to death. After collapse has existed two or three hours,
or longer, and the discharges are frequent but small in quantity, the

dependence of the collapse is less obviously the result of the amount discharged, although small discharges at this stage probably maintain the prostration produced by the violent discharges at the onset. Whether or no, the loss of 'watery and saline constituents of the blood, in any degree, occasions the stagnation of the blood—the fact of stagnation and imperfect circulation in the larger vessels, with imminent total arrest of capillary action is incontestable. During the stasis of the circulating fluid and torpor of the mass of capillaries of the frame, as in the lungs, skin, heart, kidneys and other organs, the system has little opportunity of throwing off the effects of the morbid poison, or the morbid poison itself. A remedy is required that shall restore the functional activity of the lungs. heart, and circulating system, by which alone the noxious load oppressing the vital powers, and the impurities gradually accumulating in the system, in consequence of life being carried on without proper excretions—(the absence of urine, for example) may be removed. Whilst the proper antidote to pestilential cholera remains undiscovered, any measure that prolongs life or retards dissolution, affords an opportunity for the elaboration of peccant materials in the language of the old humoral pathologists, or affords time for the substitution, in the language of the vitalists, of healthy, for morbid vital actions to take place, is deserving of full repeated consideration and trial. In many diseases, in the last stage of fever, for example, sometimes in tetanus also, life appears to be saved through the use of stimulants in considerable quantities; the apparent mode of operation of the stimulus being to nourish? and excite the heart, capillary system, and nervous system, to continue their functions, to prolong the struggle, during which the poison is thrown off by nature herself, or the morbid action exhausts itself.

Salino-alcoholic venous injections may rank as the most powerful stimulus to the heart, capillaries, and nervous system we possess. During the extreme cold stage of cholera, medicinal agents are in vain introduced into the stomach, absorption is suspended; even the most powerful emetics, fail to excite vomiting when it has spontaneously ceased.

Associated with the deprivation undergone in malignant cholera by the general system in the loss of water, salt and albuminous (flaky) matter, from the blood, and probable deterioration of con-

stituents of the blood in other ways which our present knowledge of
the pathology of cholera does not enable us to specify, we need
to remember as a cause of the fatality of cholera the non-renewal of
the blood by cessation of ingestion, absorption, and assimilation of
materials afforded by food. Nothing is more remarkable in cholera
than the utter anorexia of the cold stage and the first stages of
reaction. If the patient sink in the cold stage, before any signs of
reaction have set in, the alimentary canal, from my own observation,
in not fewer than twenty *post-mortems*, is throughout utterly free
from traces of food materials and fæculent matters, and as far
as can be judged by the absence of colouring-matter of the bile, the
contents of the intestines are free from any of the ordinary secretions
of the canal. There is absolutely nothing in the alimentary canal,
except a transparent watery fluid, or a slightly lactescent fluid,
either holding in suspension small white flakes (albumen ?) the so-
called rice-water fluid, or the contents are a perfectly white pultaceous
mass, almost as thick as " hasty-pudding," probably composed of a
vast quantity of flakes in a small quantity of fluid.

The full state of the gall-bladder replete with apparently normal
bile—attributed hypothetically by many to spasm of the gall-duct,
simply because no bile finds its way into the duodenum, and there
happen to be spasms of the voluntary muscles caused by the sudden
purging and sudden inanition resulting from it—is an indication
that no food particles have reached the duodenum from the stomach
owing to aversion of the patient to imbibition of everything but
cold water, and the incessant vomiting. As soon as vomiting remits
and reaction commences, and the patient reluctantly takes any
nutrient matter into the stomach, some food particles probably find
their way into the duodenum, for at this stage bile is apt to
appear in the secretions of stomach and bowels, and the facts I have
before mentioned suggest that these change from an alkaline to an
acid reaction upon test paper.

The *sudden* copious vomiting and purging which, often after
a few hours or days previous looseness of the bowels, is incident
to, or ushers in the cold stage, offers in its rapidly prostrating
effect an analogy with great sudden loss of blood. A large amount
of looseness of bowels or even of vomiting, like large repeated
hæmorrhages from any part of the body, is better borne by the

economy when spread over a long period of time, than the same evacuations or loss of blood concentrated into hours or minutes. In like manner, during protracted states of disease—chronic affections of the stomach for example, and severe fever—it is remarkable for how long a time life continues without risk of immediate sinking, although a very small amount of nutriment is introduced into the system; whereas a person struck down in the apparent plenitude of health, as is commonly the case in patients affected with malignant cholera, the *sudden* deprivation of assimilated materials derived from food to supply the waste of the blood, doubtless tends much to increase the mortality in collapse, as also when the patient ineffectually struggles several times into inaction before finally sinking.

Now, however useful injections of water-salts and alcohol into the blood may some day be *proved* to be, they afford but a poor pabulum on which the economy is to subsist during the exhausted attenuated condition of severe cholera. I regard one value of such injection as analogous to the value of diluted brandy in fever and many states of exhaustion, of the highest importance at the time, to rouse the heart and nervous system into action; but ultimately powerless, unless it can be followed by articles of food and their digestion and assimilation. It has been proposed to supply this presumed need of nutrient matter in the blood of cholera patients, by injecting albumen (white of egg) dissolved in the saline fluid. I am not aware of any recoveries from this method. When circumstances permit, I would advise trial of the serum of the blood of animals fresh drawn for the purpose, and mixed with the ordinary saline injection.

In conclusion, I may add that, although I regard various injections as useless when the patient is actually moribund, as indicated, for instance, by tracheal râle, it is in the present state of science only justifiable, when, in addition to the ordinary severe symptoms of severe collapse, jactitation, disturbance of breathing, denote the interruption of function, even at the centres of the circulation, and the heart itself.

When determined to resort to it, the physician or surgeon should be prepared to take close charge of the patient, and not quit him, as may be safely done after many operations, when nature once relieved, will, if unmolested, take care of herself. The quantity of

fluid injected should be moderate, although the cases narrated in this paper, show recovery took place in one case, where at the first operation eighty ounces were thrown in ; in another case forty ounces ; in a third thirty ounces. I regard forty ounces as a moderate quantity. If the patient be at first greatly relieved, but again collapses in two or three hours, or after four or five hours the operation should be repeated. Sometimes, when before the venous injection, the patient has passed with difficulty, now and then, a few tablespoonfuls of fluid and a small drain only from the bowels has been going on, it happens that a few minutes or half-an-hour after the venous injection, a copious rush of characteristic cholera vomit occurs, perhaps almost equalling in quantity to fluids injected. It has sometimes seemed as if the energetic vomiting coincident with return of pulse, and better temperature and colour, and the patient's statement of improvement from the operation might be attributable to the patient being already lifted by the operation from his extreme stage of collapse, in which he was immediately before the operation, to the state in which he was sometime before he became so much collapsed as to have warranted the operation. I would advise repetition of the injection after this re-appearance of copious cholera discharges, and, indeed, as often as collapse may return, and temporary improvement from the operation, reward our exertions.

In most diseases, in malignant cholera especially, I am convinced, despite the great mortality which attends severe collapse, under any plan of treatment, that recovery, other things being equal, is in proportion to the attention paid to the patient by his medical adviser, by the patient's friends, and by the subordinate attendants. Much may be done in the cold stage by the constant supply of cold water, by administering it to him, instead of allowing him to exhaust himself by rising into semi-erect position to take it, or by attempts to leave his couch to go to stool, by warm cataplasms and sinapisms to the suffering præcordia, by stimulating assiduous frictions to extremities and trunk, sometimes by hot-air bath and warm bath, when the patient will tolerate heat, and can be placed in the bath without exertion on his own part ; by *warm* gruel or thin beef-tea injections per anum, kept up by the hand of the nurse.

Whilst the patient is struggling into reaction, much may be accomplished by preventing the dissipation of animal heat, by admin-

istration of diluted liquid nutriment in very small quantities at a time, by injections of beef-tea per anum, by very diluted alcoholic beverages, perfect constant recumbency, very cautious augmentation of diet, and by a gentle and considerate medicina symptomatorum. Happily the violence of reaction is much diminished since there has been less resort to opium, brandy, camphor, and ammonia, than was formerly recommended during the earlier stages. In many cases the rapidity of convalescence appears remarkable when the violence of the attack is considered.

I have not designed in this paper to enter fully into the treatment of cholera, or allude in detail to the indirect methods of treatment recommended at various times immediately before, and since the first invasion of malignant cholera in 1832. One of the cases related in this paper well illustrates a danger which springs from the administration of active purgatives during "cholera epidemic." It is that of the young lady whose attack was determined apparently by an active aperient pill. I have also witnessed a rapidly fatal case of cholera determined in an elderly gentleman by an aperient pill taken at bedtime. Such facts do not encourage the hope that the indirect treatment of cholera by purgatives, a plan advisable sometimes in ordinary English summer cholera, is safely applicable to the treatment of malignant cholera. My experience, on the contrary, leads me to warn my medical friends against the castor-oil plan recently recommended. The saline treatment of Dr. Stevens is borne well, and is grateful to the patient.

Some conclusions as to venous injections in general, derived from the study of the above cases, and from the history of the operation (see note at end).

THE surgical part of the operation of infusion into the veins, and transfusion, if performed with due precautions, is not of itself dangerous.

Certain substances in solution, and certain fluids, may be injected into the veins with impunity.

In certain disordered states, in which in the balance of life and death, the scale greatly inclines in an unfavourable direction, certain

elements of the blood, deficient in quantity, such as water and salts, may, by means of venous injection, be introduced with advantage directly into the circulating system.

Injection of alcoholic fluids into the circulating system, is a powerful means of exciting the action of the heart, the general capillary and nervous systems under circumstances of great depression of these actions.   Under circumstances of great exhaustion, such as that offered by collapse of malignant cholera, by profuse hæmorrhage,—fevers? when advanced structural alterations of important internal organs do not exist, life may be temporarily maintained by venous injections, or by transfusion of human blood, until other remedies act, or the disease subside.

In certain cases where medicinal agents cannot be adequately introduced by mouth or anus, or when the mucous membrane is insensible to their action, or absorption is arrested, their fullest effort may be obtained by injection into the veins.

Venous injections may operate, not only directly through the changes effected by it in the blood, and by directly stimulating the venous, cardiac, pulmonary and cerebro-spinal tissues, but indirectly by the reaction they sometimes excite in the economy, such as vomiting, purging, perspiration.

As a promptly beneficial result in cholera collapse, venous injections certainly remove the remarkable congestion of the disease, and when the relief is more than temporary, they are *followed* by a return of an important secretion, that of the urine.

Every advance in our knowledge of the intimate pathological composition of the blood, will facilitate the determination of the states of disease in which venous injection may advantageously be employed.*

* For an epitome of the history of Venous Injections, since shortly after the time of Harvey to the present day, consult the author's paper read before the Hunterian Society in 1852, and afterwards printed for private circulation.

CASE OF

POISONING BY THE EXTERNAL USE OF BELLADONNA.

BY R. GOSSET BROWN, M.D.

On December 27th, 1865, I received a note from a noble lord staying at one of our colossal hotels,—written partly in ink, partly in pencil and diagonally over the paper,—asking me to visit him, as all objects appeared indistinct or doubled. On the day but one before I had prescribed an embrocation containing two drachms of the Liquor Belladonna in two ounces of soap liniment for whooping cough, for which he had come to town to consult me.

On my arrival I found well-marked symptoms of the imbibition of Belladonna; the pupils dilated to their fullest extent. He had placed some letters at the extreme end of the room because he could read nothing except at this remote distance, his countenance was anxious, and he spoke excitedly. His pulse was 126, small and compressible. I at once explained that these symptoms were due to the Belladonna, and wrote a prescription for another embrocation, leaving out that ingredient.

Next day (28th), a partner in his solicitor's firm summoned me very hurriedly, and on reaching the hotel I found the manager and one of the directors awaiting my arrival. In the meantime his lordship had been seen by a physician, learned in psychology, who had duly signed a certificate of insanity. Another medical friend, happily unable to attend, had been requested to fill up the second form, and three keepers were present to perform their duties. Unfortunately the embrocation containing Belladonna, the use of which I had strictly forbidden, had been again applied on the evening of the 27th. In the course of that night the patient fancied he saw a

woman lying on the sofa in his room, an old woman covered with vermin in the corner, and some one else inside his wardrobe, which he had carefully locked to prevent the possibility of escape. In order to discover how these visitants had found access to his room, the door of which was fastened, he had climbed to the top of the wardrobe, and in this position was found by his valet on going to call him. Before visiting the patient I explained to those present that the effects which had so much alarmed them and had induced them to send for the learned psychologist, were due to the Belladonna, and would vanish immediately on the disappearance of the characteristic symptoms of that drug. On seeing my patient, I found the symptoms of the previous day much augmented. I at once dismissed the three attendants, but after a consultation with the physician who had given the certificate, resolved to leave one man with our patient for the night.

Next morning I found all the symptoms of poisoning gone, and my patient quite disposed to talk freely upon the incidents of the preceding days; upon one point, however, he was certain, viz., that there had really been an old woman covered with vermin in the corner of the room, for he had placed a vessel over one of the insects crawling upon the ground. I challenged him to produce the animal, when (upon his very cautiously raising the basin) to the amusement of both, a small piece of down which had escaped from the pillow appeared.

The whooping-cough soon disappeared, and a visit to the Continent restored him to health very rapidly.

Although I have constantly prescribed Belladonna externally as an embrocation, or in the form of ointment with which to dress blisters, in sciatica or crural neuralgia, I have never before witnessed results such as here described.

The case is instructive, first of all as illustrating the small quantity of this drug from either the external or internal use of which symptoms of poisoning may arise: in the next, to act as a danger-signal, to warn us from incarcerating upon a single interview, a patient of whose history and previous treatment we know nothing.

HAMPSTFAD, *June*, 1866.

POISONING BY THE EXTERNAL USE OF BELLADONNA.

UNDER THE CARE OF DR. FRASER.

ALTHOUGH the following case has already been noticed in print, the Editors consider it worthy of mention in this place in juxtaposition with the preceding one.   Poisoning by the external use of Belladonna is an exceedingly rare event.   In ophthalmic practice especially, the use of this drug and its active salt is at the present day very liberal indeed.   It is not by any means uncommon to use a solution of atropine, four grains to the ounce, and to have it put into both eyes every quarter of an hour for several hours.   Belladonna cataplasms around the eye are frequently employed.   As a means of arresting the secretion of milk, the external employment of Belladonna has also of late years been frequently and freely resorted to.   Yet we hear of no instances of poisoning by it, and ophthalmic surgeons especially assure us, that beyond irritation to the nasal passages and throat, they never encounter any ill-consequences.

There can, however, be no doubt that the two cases now recorded are *bonâ fide* examples of the event referred to.   In one, the physician consulted, knew beforehand what remedy had been prescribed, and at once recognised its effects, but in the second the diagnosis of Belladonna poisoning was made in reliance on the symptoms only, and without any knowledge as to the preceding treatment.   In this case inquiries afterwards fully confirmed the conjecture.

To explain the rarity of these cases we must resort to the theory of idiosyncrasy.   It seems clear that some peculiar susceptibility must exist in those who suffer, when we find that out of many equally exposed, almost all escape, and only a very small minority are

injuriously affected.   It seems probable that the quantity employed
has but little to do with the result.

The following are the facts of the case alluded to, copied chiefly
(with some additions) from the notes taken by Mr. Rossignol the
clinical clerk in charge of the patient.

On the evening of October 13th, 1865, a young woman, aged 18,
a servant, was brought to the Hospital by her mistress, who said she
had been much alarmed by the girl's strange manner since the
morning.   She was afraid she was " going out of her mind."   It
looked very much like it at first; for, one moment she would appear
quite rational and look one in the face, then she would laugh childishly
and stare about her, pick at her clothes, stand first on one foot then
on the other, then wander round the room, and on being left alone
to see what she would do, she mounted up on the window-seat and
attempted to open the window, apparently with the intention of getting
out, but without any violence of manner.   She seemed simply restless
as if she could not be still.   When spoken to she at once became
attentive and quiet for a short time, and answered any question put
to her, but with evident effort, and ended with a giggle, often breaking
off in the middle of an answer, as if she had forgotten what she had to
say.   It was at once noticed that her pupils were widely dilated, and
on examination they were found to be perfectly fixed.   Her face was
pale, though not extremely so, and even when she was comparatively
quiet and attentive she had a somewhat childish, restless, eager expres-
sion, as if she were just going to start off somewhere; her pulse was
quick (above a hundred) and small, her skin was warm but not hot;
her tongue was dry and coated with fur, and her mouth was very
dry.   All the history we could get was that she had had pain in her
breasts for some days, and had gone to a chemist who gave her some
lotion in a bottle labelled "Poison," to be applied to them with cotton-
wool covered over with oiled silk.   The mistress said she thought
the lotion was laudanum.   Some of this lotion was applied to the
breasts on the evening before, and some again on the morning of the
day of her admission, after which the girl said she felt very ill; her
legs felt weak, she tried to get up to bed, but stopped short on the
stairs.   Her mistress said that in the afternoon the girl became
restless and wandered about, and as this seemed to increase, she
became alarmed, and thought it best to bring her to the Hospital.

The case so far was decidedly puzzling, for though one might have been inclined to take refuge in hysteria, the widely-dilated fixed pupils militated against that hypothesis, as they did also against the idea of commencing fever, and her skin was not hot. A student who was present —having regard to the fixed, dilated pupils, quick pulse, dry tongue, comparatively cool skin, restless manner, and the history of a lotion having been applied to the breasts—suggested that the case might be one of Belladonna poisoning. On examining the dressing, which was still applied to the breasts, it was found to have a strong odour and not unlike that of Belladonna. The girl was then questioned as to her having swallowed some of the lotion in mistake, but she would not admit it, and the mistress didn't think she could have done so, or she would have told her.

The ophthalmoscope was used, but afforded no information, excepting that there was neither marked pallor nor hyperæmia of the optic discs.

Half-a-grain of morphia was ordered every four hours till she slept, and a saline draught three times a-day.

The next day (14th), her pulse was 114 in the minute, her tongue was dry in the middle, moist at the tip and edges. She got to sleep for a short time during the night (about ten o'clock) but afterwards was delirious, and become very troublesome. She had been sick once. Her pupils were still dilated. Though she wandered at times, she was able to tell us that her limbs felt numbed, and that objects appeared a long way off, and as if double. This was probably simply from indistinctness of vision, and not that she really had diplopia. She cannot read ordinary type, but can spell out a few large letters. During the night her temperature in the axilla was 98. On the 15th it is noted that she has vomited several times, and that her pupils contract very sluggishly, and not to the normal size on exposure to strong light. During the afternoon the patient's mother brought a bottle labelled "Lotion," "Poison," and on the margin was written "Ext. Bellad. ʒss. aquæ ℥j;" thereby setting at rest the question that Belladonna had been used. On asking the girl again what she remembered, she stated, that on Thursday evening, October 12th, her breasts were dressed with this lotion, and that on removing the cotton wool which covered them, she tore the skin, making it bleed. On the following morning she again

applied the lotion and cotton-wool, covering up with oil-silk. She remembered being unable to walk upstairs, "she crawled up on her hands and knees," and was helped into bed about eleven in the morning, but she has no clear recollection of anything since, till the morning of Saturday the 14th.

On the 20th she had quite recovered.

The symptoms in the above case may fairly be attributed to Belladonna poisoning, but whether the drug were imbibed through the skin, or whether the girl drank some of the lotion, cannot positively be settled. We have only her statement, repeated most definitely, that she did not do so. There was certainly very little abrasion of the skin, but she gave a clear account, as above noted, of having torn the skin in taking off the dressing.

TWO CASES OF

ACUTE SUPPURATION IN THE KNEE-JOINT,

IN WHICH RECOVERY WITH FREE MOTION ENSUED.

BY ROBERT B. CARTER, F.R.C.S.

I AM desirous to place on record, a short account of two cases of acute suppuration within the knee-joint, one of them occurring in a patient most unfavourably situated, and both terminating in perfect recovery of all the functions of the articulation. The result was probably due, in some measure at least, to the success of the contrivance used, to afford rest to the affected part, and support to the limb ; and, it is to the details of this contrivance, that I seek to direct attention.

H. C., a coal-miner, in the prime of life, and remarkable among his fellow-workmen for his great strength and endurance, received a severe blow upon his left knee, by the falling of some masses of stone, from the roof of the stall in which he worked. Notwithstanding severe pain, he continued to labour until his usual hour ; and then walked a mile and a-half to his home. On arriving there, he went to bed, and enveloped the injured joint in mustard poultices. The next day I was asked to see him.

It is not remarkable that a joint thus injured, and thus ingeniously maltreated after the injury, became the seat of acute inflammation ; nor that, when the inflammation had somewhat subsided, the articular cavity was left much distended by fluid. In due time, an exploratory puncture showed the contained fluid to be pus ; and it was evacuated by a free incision into the joint, in the direction of the axis of the limb, and just external to the outer border of the patella.

The pressure of the distended joint upon the veins, had produced

considerable œdema of the leg; and, on this account, it seemed desirable to obtain firm and accurate mechanical support for the leg, as well as immobility of the articulation. For these purposes, the following contrivance was employed:—

A splint, as light and thin as was consistent with the possession of the necessary strength, was cut from a flat piece of deal. This splint was long enough to reach from the tuber ischii to the os calcis. At the upper end it was about three inches in width, and it gradually tapered to an inch and a-half at the lower end; so that, when in position, it was everywhere overlapped by the limb. It was padded by two or three strips of blanketing, and by a little cushion to fill the ham; and it was secured upon the centre-piece of a many-tailed bandage. This centre-piece was somewhat longer than the splint, so as to turn round the heel, and reach along the sole of the foot to the roots of the toes. The tails were rolled up and tacked to two pieces of tape, and the whole apparatus so fastened together, that it could be put into its place by once elevating the limb. The heel and malleoli were then protected by strips of soft leather, spread with lead plaster; the splint was placed in position, and the leg gently lowered down to rest upon it. The pad under the ham was accurately adjusted, a little cotton-wool placed to fill up any hollows, and then the tails of the bandage were laid down firmly and closely, from the toes upwards, and thoroughly secured by starch. Opposite the knee-joint, two tails on each side were left unstarched; but the starch was again applied above. The unstarched tails were pinned, so that they could be opened to renew some charpie, placed over the wound to absorb the discharge. As soon as the starch had hardened the limb was slung by tapes from a common cradle, so as to move freely from the acetabulum, and to allow the patient to lie in almost any position.

After a few days, the subsidence of œdema loosened the bandage. It was then carefully cut through on both sides of the limb, and the whole dressing removed and reapplied, with the smallest possible movement or disturbance.

The discharge from the joint, at first purulent and profuse, gradually became serous and scanty. After a time it formed a scab, by which the wound was completely sealed.

I expected no better result than anchylosis; and, when the scab

fell and disclosed a firm cicatrix, I removed the splint and bandage, and left the patient in bed. On visiting him the next day, he was up and dressed, sitting in a chair, with both knees bent in the ordinary manner. He said that a stiff leg would cripple him as a miner, that he determined to try and bend his knee, and that the attempt succeeded. No bad symptoms followed; and he soon returned to his work. He remained under my observation for more than two years; and the joint that had suppurated was in every respect as strong, as flexible, and as useful as the other.

With the preceding case fresh in my recollection, I was asked by the late Mr. Fox, of Nottingham, to visit for him a pauper patient, who lived near my own house. I found a young woman, the daughter of parents in easy circumstances, but who had been seduced, and had left her home in consequence. She had earned a scanty subsistence by needlework; and, when I saw her, she had been three weeks delivered of a puny infant, that died shortly afterwards. A few days after her confinement, her right knee-joint became inflamed. I found her with the joint much distended and pointing, with a high degree of irritative fever, half-starved, and thoroughly miserable. Mr. Fox was kind enough to surrender her entirely to my care; and to furnish me with orders to the relieving officer, for everything that her case required.

A free incision into the joint gave exit to a quantity of pus, and to masses of pus-clot, some of which were so large, that they required to be eased through the wound. After the incision, the splint and bandage already described were carefully applied.

On account of the unfavourable condition of the patient, it was manifest that a good result could only be obtained by extreme care; and, living near, I availed myself of the proximity to superintend the nursing. For many weeks I took charge of the affected limb, during every change of bedding, clothing, or position. The case was much more protracted than the former one; but its course was in all essentials the same. The purulent discharge became serous, and the wound was sealed, after a time, by a scab, under which, it united firmly. When this scab fell, gentle passive motion was carefully employed. It was followed by increased heat of the joint; and this heat was subdued by irrigation with cold water. By slow degrees, free movement was obtained; but, for many months, increased heat

N

was produced by any undue exertion, and sometimes by atmospheric changes. Cold water was always effectual as a remedy, strength was gradually gained; and, after the lapse of a year, the patient was able to say that nothing remained, save the cicatrix of the incision, by which she could distinguish the joint that had been inflamed from its fellow. I saw her at intervals for nearly three years, and her condition underwent no change.

The great value of firm mechanical support, of strapping and bandaging, in all congested conditions of the lower extremity, has long been recognised and taught at the London Hospital. The cases above described, seem to be illustrations of the same principle, and to show that mechanical support promotes the process of repair, under even the most unfavourable circumstances. It has been the sole object of the writer to bring this fact into prominence; and, hence space has not been occupied by unimportant details about the general or dietetic treatment of the patients. The point of most importance seems to be the *narrowness of the splint ;* which, while securing the necessary immobility of the articulation, was nowhere wide enough to throw off the grasp of the bandage, or to diminish its compressive action upon the limb. Next in importance was the slinging from the cradle, which, by allowing changes of position of the body, greatly promoted sleep, and prevented the occurrence of bedsores. The dressing was so light that the patient could turn the affected limb in its slings at pleasure, and could lie on the side opposite to it as easily as upon the back.

STROUD, GLOUCESTERSHIRE, *July*, 1866.

CASE IN WHICH THE

SYMPTOMS OF A LARGE ABDOMINAL ANEURISM

WERE PRESENT, AND CURE RESULTED.

BY FREDERICK H. DALY, M.D.

THE following case of supposed aneurism of the abdominal aorta, cured by treatment, will, I trust, prove interesting to the profession.

It presents several most important features. It was a case in which the diagnosis seemed clear and positive, and, in which, therefore, we (Mr. Hutchinson, who saw the case with me, and myself), gave a most unfavourable opinion, yet, happily, by long-continued care and treatment, the patient is now restored to health.

Mr. F——., aged 38 years, first became my patient in July, 1865, suffering from an attack of acute dysentery. He had always been, previous to this, a healthy man—never had any illness. Under treatment the acute dysentery subsided into chronic, which for a long time resisted all treatment; but, however, eventually left him completely, in the early part of October. The patient then resumed his accustomed employment, that of foreman at a cabinet-maker's, and regained his former health.

In March, 1866, I was again summoned to attend him; I found him with a rather anxious countenance, complaining of some pain at the pit of the stomach, and troublesome vomiting. Being rather pressed for time, I did not examine the case very carefully, and attributing the symptoms to gastric disturbance, I prescribed accordingly. On the following day I again saw him; the vomiting had somewhat abated, but he now called my attention to a "strange beating at the pit of the stomach." I carefully examined him, and *

found, about two inches below the ensiform cartilage, a large tumour, nearly the size of the two fists doubled, visibly pulsating.   I applied the stethoscope to it, and there was a loud distinct bruit, immediately following the systole of the heart.   I was able by firm pressure to empty the tumour somewhat of its contents, but it filled again directly.   The pulsation was of that expansive nature, so characteristic of an aneurism.   The heart's-sounds were normal, and there was no perceptible difference in the femorals on either side.

The patient informed me, that some days previously, as he was lifting a heavy piece of furniture in the warehouse, he thought he " felt something give way in his inside."   Regarding the whole case, I had no doubt that it was an aneurism of the abdominal aorta, and therefore, expressed a most unfavourable opinion as to the result, but said, that I should much like Mr. Hutchinson to see him with me.   On the following day, therefore, that gentleman and I met at his house, and Mr. Hutchinson, having most carefully examined him, expressed a positive opinion, that he was labouring under an abdominal aneurism, and added that we could scarcely entertain any hope of a favourable issue.

We determined, however, to keep the patient in a state of absolute rest in bed, and, indeed, that he should scarcely be allowed to speak, and that all excitement should be avoided.   We recommended, also, that he should have a nourishing, unstimulating diet, with as little fluid as possible, that ice should be kept constantly applied to the tumour, and that he should take the diacetate of lead internally.

This plan of treatment I carefully carried out.   I gave him three grains of the diacetate of lead, with a quarter of a grain of opium, three times a-day, which he continued to take regularly for fifteen days,—until there was a distinct blue line along the edge of the gums.   The lead caused no colic, although he took 135 grains, but he lost flesh, and his appetite almost completely failed him.   It also caused much constipation, requiring enemata.   I now discontinued the lead for about a fortnight, still keeping the patient perfectly quiet, and the ice constantly applied.   During this period I made but little examination of the tumour, believing handling injurious.   At the end of the fortnight, I applied the stethoscope to the tumour, and was astonished but pleased to find, that there

was no longer a bruit audible, although there was still pulsation. The tumour was also much smaller and firmer. I then immediately again commenced the lead, giving the same dose as before, three grains three times a-day, and continued it for twelve days (the patient this time taking 108 grains) when I was obliged to discontinue its use, as he was seized with abdominal pain and distention, vomiting and constipation. I ordered turpentine fomentations to the abdomen, large enemata, and effervescing medicine.

The following day all the symptoms of obstruction were worse, nothing had passed from the bowels. I again called in Mr. Hutchinson, and he advised a continuance of the enemata, and small doses of sulphate of magnesia internally. He considered the obstruction probably due to a collection of scybalæ, caused by the lead. On the following morning there was still no motion from the bowels, and the abdominal distention was greater. I ordered him a little brandy and soda-water, every half-hour, and a large turpentine enema, frequently repeated. I again saw him at five in the afternoon; the bowels had acted, the vomiting had ceased, and he had passed a large quantity of scybalæ.

The next day he was much better, his countenance had lost its anxious expression, the distention had nearly subsided, and his bowels had acted twice naturally.

At the end of a week he had quite recovered from the attack of obstruction, and I once more examined the aneurism; but now I could neither hear a bruit nor feel pulsation; when, however, I pressed my fingers well back towards the vertebral column, I could feel a certain amount of thickening in front of the artery, in the site of the aneurism. In about ten days from this—nearly three months from the date of his first visit—I again requested Mr. Hutchinson to see him, and he was also of opinion that the aneurism was cured. In a few days we allowed him to get up, and he is now (June 19th) about to start for the sea-side.

Remarks.—The question then suggests itself, *To what are we to attribute the cure?* whether to the rest and diet, together with the constant application of the ice so long and steadily persevered in, or to the *lead?* No one, of course, will question the necessity of

the former, but I cannot help thinking that this man owes his life, in a great measure, to the action of the lead, and that it is well worthy of further trials in such cases.

In conclusion, I may remark, that although I kept the ice constantly applied night and day for more than two months, the patient suffered neither pain, nor any tendency to sloughing of the skin from its lengthened application, nor other inconvenience. It is only fair to our patient to add, that throughout the treatment he exercised the most praiseworthy patience, observing the recumbent position most literally during the whole of the two months. As the diagnosis of abdominal aneurism is beset with difficulties, I have been careful in giving a title to this paper to avoid too great positiveness. That a large tumour was present just below the epigastrium there could be no doubt, nor any that it had an expanding impulse, and a very distinct bruit. The expansive character of the impulse was most decided. Having stated the symptoms and their gradual disappearance under the regime adopted, I must leave the reader to form his own opinion as to whether the diagnosis was probably correct.

101, QUEEN'S ROAD, DALSTON.

P. S.—August 14th, 1866.—At the present date the subject of the above case is in good health and has returned to his usual pursuits. No tumour can be discovered in the abdomen.

CASES SELECTED

THE HOSPITAL GOLD MEDALS OF 1865.

[Two Gold Medals are awarded by the Hospital Committee annually for general proficiency in practical medicine and surgery. In addition to an estimate of the relative amount and quality of the work done by the several candidates in the Hospital Wards, during the year, as dressers, &c., it is required that they shall undergo a competitive examination on clinical subjects, and that each shall also furnish the notes of not fewer than six cases.

The gold medal for medicine was awarded this year to Mr. Alfred Walker. Two candidates for the surgical gold medal, Mr. F. S. Colquhoun and Mr. F. M. Mackenzie, were considered to be so equally and so highly meritorious, that the Surgical Staff recommended the award of two medals. To this proposal the Hospital Committee kindly assented. The following cases are from the notes supplied by the different competitors. In some instances the notes are almost in full, but in most cases they have been greatly abbreviated, and are in fact only abstracts of the original reports. It is due to Mr. Colquhoun to state, that this remark especially applies to his cases, which were recorded in great detail].

CASE I.—*Morbus Addisonii.—Death.—Post-mortem.*

(Under the care of Dr. Parker.)
(Reported by Mr. A. Le Rossignol.)

Catherine S., aged 15, unmarried, a servant living at Poplar, was

admitted on the 15th of November with bronzing of the skin associated with general anæmia.

The family history afforded no evidence of tubercular or other hereditary diseases.

The girl was of a sallow complexion; her hair brown, and her eyes blue, and she was still moderately well-nourished. She had had measles, scarlatina, and scarlatinal dropsy; the latter when eight years old. For two months before her admittance she had been generally ailing. About this time she first noticed the darkening hue of the skin. Sickness then came on; at first only in the morning; then it increased to seven or eight times a-day. At last she became so weak that the day she left her situation (three weeks before her application at the Hospital) she fell down while at work and could hardly raise herself. Her mistress then sent her home. A few days after her return home she menstruated freely. The sickness continued and was easily excited by motion. Pains in the loins and stomach then supervened. She would sometimes go a day and a night without passing urine.

Condition on Admission.—There is a general duskiness of the skin; a distinct pigmentary deposit of a circular form on the middle of the forehead, and on the right cheek, about the eighth of an inch in size, within the mouth. There are dark areolæ around the nipples, which are normal in size. Dark lines are to seen above the ilia where the clothes hang on the hips, and just below the knees where the garters press the legs. The darkest pigmentary deposits are those above the ilia, which are of a chocolate-brown. The whitest portions of skin are those covering the mammæ.

The tongue is thick and coated, the bowels are not confined; there is pain at the lower portion of the abdomen.

Breath-sounds normal; no dulness on percussion.

Pulse 120, quick and small. The insides of the lips and the tongue have a very anæmic appearance. The skin is very dry and does not appear to excrete. The urine is normal in quantity, sp. gr. 1015 ; no albumen; excess of phosphates ; no sugar.

The patient is very weak and listless; so much so, that her intellect might be thought defective.

November 27th.—This morning when the nurse put her near the fire, while her bed was being made, she fainted, and would

have fallen, had she not been supported.   Pulse very weak and small.

She lingered, in a semi-comatose state, from the 4th of December to the 6th, when she died.

Post-mortem.   Body tolerably well-nourished.   Muscles flabby, general anæmia.   Bronzed skin.   Darkening of skin on the centre of the forehead, round the nipples, in the folds of the groin and axillæ, over the hips, and in the flexures generally.   Dark spots on the right cheek, inside of the left ;. on the vulva, and on the labia minora.

There was an inch of fat on the abdomen.   The thoracic organs were normal in position and in external appearance.

The pericardium contained an ounce of pale serum.   There was a large, firm, pale clot, on the right side of the heart, extending into the pulmonary artery, also another on the left side, extending into the pulmonary veins.   The mitral valves were slightly thickened. The apices of both lungs contained a very small patch of tubercle. The bases of both lungs were collapsed and slightly congested, some portions were emphysematous.   The left lung weighed eight ounces and a-half, the right ten ounces.

The liver, rather waxy in appearance, weighed two pounds four ounces and a-half.

Both supra-renal capsules were fully two inches long by one broad, very hard.   On section, some portions had the appearance of a yellow putty-like matter ; others were hard and translucent, and in a few places there was a gritty material, easily felt with the fingers.   The capsules were wholly disorganized.

Misroscopic examination of the capsules showed malformed cells and molecules resembling tubercle and cretaceous granules.

CASE II.—*Aneurism of abdominal aorta.—Death from rupture into the abdomen.*

(Under the care of Dr. Parker.)

(*Reported by Mr. Walker.*)

Benjamin R., aged 37, was a short, stoutly-built man, well-formed, but pale and slightly emaciated.   He had been for many

years a sailor; but latterly had been a labourer in the Docks, where he had been accustomed to lift heavy weights. About three months ago he noticed a lump in the epigastrium, which "throbbed," but which gave him but little inconvenience, and he was able to continue his work up to about three weeks ago, when he began to feel great pain after taking food.

On admission, the prominent symptom was pain, and occasional sickness after taking food. There was a hard nodulating swelling in the epigastrium, about the size of a china orange, it rose considerably with each pulsation of the aorta, and transmitted a bruit with the systole, but it was doubtful whether this bruit was conducted from the aorta, or was in the tumour itself; there was no perceptible lateral expansion. He was cheerful, did not complain of any particular pain, except after eating, and there was no pain in the back.

February 1st.—Early this morning he became suddenly collapsed. with all the symptoms of internal hæmorrhage, quite blanched; cold extremities; almost pulseless; severe burning pain in epigastrium.

2nd.—Has rallied very much, and seems easy; has been attempting to sit up in bed.

5th.—Expresses himself quite comfortable; eats with good appetite.

7th.—This afternoon he had been reading, and on sitting up to reach the book again, he fell back in the bed, and died in a few minutes.

Sectio cadaveris.—Body rather emaciated. On opening the abdominal cavity a very large quantity of bloody serum and clots escaped, equal to four or five pints. The ascending portion of the arch of the aorta was dilated, and a saccular aneurism was found on the posterior part of the descending arch. On tracing the aorta downwards through the diaphragm, an aneurism was found about the size of a large fist, apparently a dilatation of the artery all round; but principally on the right side. The cæliac axis and the superior mesenteric arteries took their origin from the left side of it, rather at the posterior part, and were not at all dilated; it was opposite the eleventh and twelfth dorsal vertebræ, which bones it had much eroded, having destroyed almost the whole of the body of the eleventh. The sac was filled with layers of soft fibrin, especially in front, where it was *almost solid.*

There were two rents in its walls, one rather to the right upper side, a small one, and which was closed by a plug of fibrin, and another quite at the lower left surface, large and irregular, about the size of a half-crown piece. Kidneys small and much contracted in parts, the right one being almost in two pieces; other organs fairly healthy.

The diagnosis was at first rather doubtful in this case. There was a tumour in the epigastrium, which rose and fell with the pulsations of the aorta, but which had no lateral expansion, and caused the patient no pain in the back; the heart's-sounds also were nearly healthy. These symptoms were hardly sufficient to characterize aneurism, while the pain, after eating, the vomiting and position of the tumour seemed rather to point to cancer of the pylorus or pancreas; but the sudden collapse on the 1st of February, with all the symptoms of internal hæmorrhage, settled the question pretty conclusively. This aneurism must have commenced as a fusiform true aneurism, and, as it increased in size, the right side happening to be the weaker, yielded most. The pain, after taking food, was probably produced mechanically by the pressure of the tumour on the stomach, while the layers of firm, dense fibrin in its anterior part quite accounted for the absence of lateral pulsation. The collapse, on the 1st, was most likely produced by hæmorrhage from the small aperture in the upper part of the tumour, which was accidentally stopped by a plug of fibrin getting into it, while the enormous rent in the lower part, was the evident cause of the man's sudden death six days after.

It is singular that, with so much disease in the vertebræ, no pain should have been felt in the back; also, that the valves of the heart were healthy, and that no patches of atheroma were found in the coats of the arteries examined.

CASE III.—*Repeated attacks of acute Rheumatism.—Purpura.—*
Effusion into scrotum.—Recovery.

(Under the care of Dr. Davies.)
(*Reported by Mr. Walker.*)

Thomas F., aged 33, was admitted January 30th, 1866. Two years ago had been admitted into Hospital for acute rheumatism,

having been twice before in "Guy's" for similar attacks. He was placed under the care of Dr. Davies, by whose orders blisters were applied to all the affected joints, he was relieved of all pain in twenty-four hours by this treatment, and left the Hospital cured six weeks after. He is a man with a taste for scientific pursuits, to follow which, he has been in the habit of spending most of his wages in books, mathematical instruments, &c., and in order to do so has lived on a very low diet, consisting chiefly of bread and coffee or tea. Ten days before admission he had another attack of rheumatism, and remembering the effects of the former treatment, purchased, and himself applied, eight blisters to the affected joints. This treatment again relieved him; but during this time he had been unable to eat the coarse diet he had provided for himself, and consequently had taken little or no food. Three days before admission he noticed large purple spots appearing at the inside of his ankles and knees; he thought very little of this however, but applied to be taken in on account of his rheumatism. There had been no bleeding from any mucous membrane.

On admission, he complained of some pain in his joints, but the symptoms were not very acute. On the inner sides of his ankles, on his insteps, and on his arms were large purplish blotches. He was ordered decoction of bark with lemon-juice every four hours; to take milk diet and half-a-bottle of claret daily. Urine sp. gr. 1025; very acid. No albumen.

31st.—Mouth sore, gums very tender; to apply tannin; and as his bowels were not open, he was ordered a purge.

February 2nd.—The scrotum and penis have suddenly become much distended and dark coloured; the extravasation extends on each side as far as Poupart's ligament, and into the perinæum, which is much distended; a full-sized catheter can be passed into the bladder; but there is undoubted history of stricture; there is, however, very little general fever; the patient passes his urine and takes his diet.

3rd.—He was seen to-day by Mr. Maunder, who gave his opinion that the effusion into the scrotum was not urine; advised acupuncture of the distended parts, but declined further operative interference.

5th.—Acupuncture gave considerable relief, swelling has somewhat decreased; very little pain felt; the purplish blotches are increasing in number, a few appearing on the upper part of the trunk; his

joints are painful. Ordered tincture of iron and chlorate of potash.

7th.—Swelling rapidly subsiding, and the skin regaining its natural colour ; wishes for more to eat; ordered boiled mutton.

8th.—A spot on the inner side of the left arm, which was painful yesterday, has to-day taken on violent inflammatory action. Ordered an ounce of turpentine mixture every four hours, a linseed poultice to the arm, and the diet to be changed to fish.

9th.—The inflammation has proceeded to gangrene of the skin ; a portion about the size of a crown-piece, being quite livid and dead.

13th.—Slough has separated, and the wound underneath looks healthy ; to return to the mixture of iron and chlorate of potash.

15th.—Wound looks very well; the œdema and discoloration have nearly disappeared from the scrotum, &c., and most of the spots have gone from the legs. Ordered oysters, also water-cresses and green vegetables.

16th.—Wound in arm is very healthy, but rather slow in healing ; the whole arm to be lightly bandaged with a flannel roller. Patient asks for more to eat; ordered four ounces of extra bread. Urine examined to-day, and traces of sugar found with a sp. gr. of 1020.

March 1st.—Since the last note he has been steadily improving ; the wound in the arm is rather slow in closing up, but looks quite healthy ; there are no spots anywhere on the skin, and the pain has quite left his joints ; he gets up and sits by the fire, but is still very weak.

10th.—In bed again with a slight return of the rheumatism ; the arm is still bandaged, as the wound is not quite healed.

13th.—This evening several raised patches of a purplish colour have appeared about him, which appear to be a mixture of the purpuric rash with urticaria ; there is very little irritation, and he does not seem to suffer much constitutionally.

19th.—He is now convalescent and expects soon to leave the Hospital : the day before yesterday he had some slight rheumatic pains in his knees, but these were gone in the morning ; he has no spot anywhere ; the wound in the arm is healed ; he eats well and sleeps well.

This case was one of considerable interest, on account of the peculiar effusion into the scrotum and adjacent parts. It resembled in almost every particular, an ordinary extravasation of urine.

Against this diagnosis we had—the absence of any tight stricture for some time past,—the fact that a large catheter (No. 8.) passed easily into the bladder,—the peculiar state of the man's blood at the time, many small extravasations occurring elsewhere,—and the absence of any serious amount of symptomatic fever, and also of that extreme pain and tenderness on pressure, which usually is present when urine is permeating the cellular tissue.

CASE IV.—*Case of paraplegia of motion, and, to slight extent, of sensation also.—Recovery under treatment by Iodides.*

(Under the care of Dr. Parker.)
(*Reported by Mr. A. Le Rossignol.*)

Henry M., aged 40, clothier's cutter, of intemperate habits, was admitted into the Hospital with paralysis of the lower extremities on the 10th of October, 1865.

He stated that he had been accustomed to consume five ounces of cut-Cavendish tobacco per week; smoking and chewing.

He had had chancres twice; the first when about seventeen, when it was followed by a bubo. The second time was four or five months before his admission. He had also had gonorrhœa four or five times. Never had any other disease.

The disease from which he was now suffering came on with a pain in the lumbar region, extending round the loins. Turpentine and ammonia were used topically, but with no good result. A day or two after the first accession of pain, while standing, he felt his left knee bend under him; subsequently, in getting out of bed, his legs would feel quite stiff for sometime. His right leg became affected on the 4th of October, but previous to this he had left off work for three weeks. When admitted, he could not use either of his legs. There was no tender spot on the lumbar, sacral, or dorsal region of the spine. Hot water and ice produced only the usual effects; no reflex action. There is numbness, but the touch of the finger or the point of a needle are easily felt. The sphincter ani, and sphincter vesicæ are completely paralyzed. Urine, alkaline and phosphatic. No evidence of cardiac or pulmonary disease. Pulse a little sharper, but not quicker than usual. A large bed-sore just above the nates. Ordered three grains of iodide of potassium three times daily.

October 12*th.*—The left knee can be flexed slightly, but very slowly. The patient says he can feel better on the left leg than on the right.

13*th.*—Has not as much power over the left leg as yesterday. Painful spot near second lumbar vertebra.

15*th.*—About the same. Small ulceration round the orifice of the urethra, due to the irritation produced by the strongly ammoniacal urine. The patient complains of a tightness above the navel. Urine sp. gr. 1020. Excess of phosphates. No albumen.

16*th.*—The bowels are confined. To take decoction of cinchona with nitric acid.

17*th.*—The bed-sore is looking much better. Collodion to be applied round it, and wet cotton-wool over it. The patient can move his left leg, and turn the foot sideways.

21*st.*—A small sore over the right trochanter. Bowels do not act without aperient medicine.

26*th.*—Can flex the left hip-joint. Bed-sores looking healthy; collodion to be applied around them. The ulcer on the glans penis to be rubbed over with sulphate of copper.

30*th.*—To discontinue the nitric acid mixture, and take instead decoction of bark with five grains of iodide of potassium.

November 2*nd.*—Appetite improving. The patient can now flex his right hip and knee.

6*th.*—Both legs are now easily moved; but the patient cannot stand. The urine is not yet retained, it causes great annoyance to the patient when sitting up, by constantly dribbling away. He is improving in all other respects very satisfactorily.

9*th.*—The urine dribbling on to the right thigh has produced some excoriations.

31*st.*—The patient can stand for a few seconds at a time.

December 4*th.*—Crutches were ordered. The iodide of potassium to be increased to seven and a-half grains.

11*th.*—The patient can now, with the aid of crutches, walk round the ward.

14*th.*—The crutches are put aside, and the patient can walk with the help of two sticks.

From this date, up to the day of his discharge, the patient continued improving in health, and when he was discharged on the 26th of

January, he had perfect power over the lower extremities, and could walk without any support whatever.

He has since attended as an out-patient. I have lately learnt that a month ago he had a fit, and that his mouth is now drawn to one side.

CASE V.—*Extensive phlebitis with plugging of the superficial veins of both lower extremities.—Albuminuria.—Recovery.*

<div align="center">(Under the care of Dr. Davies.)</div>

<div align="center">(Reported by Mr. Le Rossignol.)</div>

James R., aged 26, a watchman, rather sallow, but moderately well nourished, was admitted into the Hospital on the 26th of October, 1865, with a swelling in the left thigh.

A few years ago he had jaundice, and within the last two months a chancre, but no bubo. Has lost flesh lately.

His present illness began a month ago with rheumatic pains in the joints : the ankles, and knees, were swollen and hot. The urine was thick, and deposited a pink sediment. For three weeks he remained away from work, and during this time attended the Metropolitan Free Hospital for about a week ; at the end of which he returned to his employment for a few days, but was soon obliged to apply to the Hospital for admittance.

When admitted (October 26th, 1865), the right long saphena, the left long saphena, and the right short saphena veins were indurated throughout the whole of their lengths. The left superficial circumflex ilii, and superficial external pudic were similarly affected. There was great tenderness, redness, and swelling of the skin over the upper portion of the left saphena vein. The heart's action was weak, and a soft systolic murmur was heard at the base of the heart, and in the supra-clavicular regions. The bowels had been confined for three days. The tongue was furred and moist.

The quantity of urine passed was slightly in excess of the normal quantity; sp. gr. 1012 ; albumen about one tenth.

Headache was a constant symptom.

October 27th.—The pain in the left thigh was so great that the patient could not sleep. Six leeches were applied along the course of the left long saphena vein. An ounce of house-medicine was ordered to be given.

28th.—The swelling is not so painful. Spongio-piline is kept constantly on the thigh. The appetite is improving. Bowels open.

November 1st.—The legs were bandaged from the toes up as far as the groins. Albumen still present in the urine.

4th.—The patient complained of pain in the knees and shoulders. A quarter of a grain of morphia was ordered to be given at bedtime.

7th.—The pain in the joints had subsided. There was no swelling now in the left thigh, but the veins of both the lower extremities were still indurated.

12th.—Iodide of potassium in five grain doses was ordered.

20th.—The lower portion of the long saphena veins were not so hard and cord-like as at first. Albumen still present in the urine.

December 2nd.—The patient was discharged. When he left the Hospital the veins were still hardened, but there was no active disease going on.

CASES VI., VII., and VIII.—*Notes (abridged) of three cases of obstruction of the bowels, extending over periods of fifteen, five, and four days, produced by the impaction of hardened fæces in the rectum, and colon ;—treatment chiefly by large enemata, with cure in all.*

(*Reported by Mr. F. S. Colquhoun.*)

(CASE I. Under the care of Dr. Fraser.)

John B., aged 35, barman, was admitted in the London Hospital on February 13th, 1866, stating that he had had no action of the bowels for five days. His face was anxious and pallid, of a dirty hue; skin clammy; pulse rapid and feeble; lips and mouth dry tongue loaded with dirty yellowish fur, and rather dry; breath hot and fœtid. When examined in bed, there was considerable fulness of the abdomen, especially at the left flexure and descending part of colon, the abdomen was tympanitic, and pressure on it gave him pain. He had almost constant vomiting for the last five days with complete anorexia, urine scanty, loaded with lithates. Has always suffered from constipated bowels, but never had a similar attack before. Borborygmi and eructations constant. Ordered a turpentine enema and put on a milk and beef-tea diet. In the evening had two or three

o

evacuations of hard, dark, lumpy fæculent matter, coated with mucus, and passed a quantity of flatus, and.felt much easier.

February 14*th*.—Better ; passed a fair night, as bowels were still painful and loaded. He was ordered two ounces of house-medicine with thirty drops of laudanum. Meat diet with milk. He had several very copious evacuations during the day, and sickness ceased. Thirty drops of laudanum at bedtime.

15*th*.—Better; bowels still unloading themselves, but very much confined with great accumulations of flatus. Enema to be repeated.

18*th*.—Up to the 18th, his bowels continued to unload themselves, great masses of hard, dark, fæculent matter coming away. On this date they again showed a tendency to become sluggish, and he was ordered an ounce of castor-oil, with two drops of laudanum. He had a very copious evacuation after this, and in the afternoon left the Hospital quite well. He was ordered some quinine mixture with chloric æther to take with him as well as some five gr. aloes and myrrh pills.

(CASE II. Under the care of Dr. Davies.)

Louisa W., aged 20, shoemaker's wife, was admitted on January 30th, 1866, stating that the bowels had not been relieved for fifteen days past. She was exceedingly thin and weak ; could scarcely stand. Pulse 120, very feeble. Hair black, and surface generally dark, conjunctivæ jaundiced. Tongue thickly furred and dry ; fœtid breath. Rectum jammed with fæces, and lumps can be felt through abdominal walls all along the colon. She said that she had been living very badly lately ; had one child eighteen months ago ; weaned it at thirteen months ; has always been subject to constipated bowels, but never had a similar attack before. She was ordered a warm-bath, after which to take an aperient, with twenty drops of laudanum, and to have five pints of warm water steadily injected, the tube to be passed as high as possible. Soon after she began to pass masses of scybalæ, and continued to do so through the day.

January 31*st*.—Almost free from pain ; bowels still unloading themselves. Ordered half-an-ounce of castor-oil, with ten drops of laudanum.

February 1*st*.—Vomiting and all uneasiness ceased, and she feels

quite well, but very weak. Tongue clean, and she would like something more to eat. Urine nearly clear ; bowels still unloading. Ordered an ounce of quinine mixture, with chloric æther, and to have chop and a pint of porter instead of milk diet. She went on perfectly well, getting up, eating all her diet. Bowels acting once—sometimes twice daily. Urine got quite clear till February 5th, when she again became very sick, but without pain, and abdomen felt quite soft; this was supposed to be due to pregnancy, though the uterus was not perceptibly larger, still venation with darkening of the areolæ of the nipples, and enlargement of follicles were present. She was ordered an effervescent draught every four hours, with the addition, on the 6th, of three drops of dilute hydrocyanic acid to each ; however, this did not stop the vomiting, whilst, in other respects, she was quite well. On the 7th, she was ordered three grains of the oxalate of cerium when the vomiting came on ; she only took three doses of it, and was perfectly cured, and whilst in the Hospital had no return of it. She continued steadily to improve in health and appearance ; the bowels resumed their function acting once, sometimes twice daily, without medicine, and she left the Hospital on February 17th, perfectly cured.

(Case III. Under the care of Dr. Parker.)

William B., aged 49, labourer, well-developed, muscular man, was admitted January 20th, 1866, stating that his bowels had not been relieved for four days. His face was anxious, skin and conjunctivæ muddy. Skin hot and dry ; breathing rather hurried ; lips and mouth dry ; tongue loaded with fur, breath fœtid and hot ; felt very sick, but had not vomited ; habitual constipation. Abdomen tympanitic, with retention of urine and decided fulness at left flexure of colon where abdomen was most tender. He seemed to suffer a great deal of pain. Pulse rapid and feeble. No action of bowels for four days, but had been confined for fourteen or twenty days before admission. Partial retention and suppression of urine. Ordered thirty drops of laudanum at once. A long flexible O'Beirne's tube was passed up the bowel until quite five feet had gone up, and then five pints of warm water were slowly and carefully injected, the bowel being fully distended by it; in fifteen minutes some of the fluid returned coloured, and in eight hours he had six very copious

stools, all of them hard, dark, and lumpy. The relief to all his symptoms was most marked; the tympanitic fulness, and tenderness disappeared. He passed a quantity of urine, and perspired slightly. Linseed-meal poultices were ordered to be applied to the abdomen, and he was put on milk diet and beef-tea.

January 21*st*.—He slept well, and is almost free from pain; bowels still unloading themselves; urine high-coloured and turbid. Tongue cleaner and moister; pulse quieter.

22*nd*.—Bowels still continuing to act; skin much clearer; face not so anxious. Ordered a mixture containing nitro-muriatic acid, and laudanum. Continue poultices and diet.

23*rd*.—Bowels still acting, fæculent matter softer, and not quite as dark. Appetite returning. Ordered light pudding, two eggs, milk, and beef-tea.

25*th*.—Bowels only acted once a day. He is now getting fast well. Urine clear, of rather low specific gravity—alkaline. Pulse quiet, and gaining strength. Tongue fast cleaning. Ordered more beef-tea.

27*th*.—Been up since last date, and is fast regaining strength. Bowels have not been open since 25th. Ordered extra bread and an aperient.

He continued, uninterruptedly, to get quite well; the aperient draught acted freely. On the 29th, put on fish and milk; on the 1st of February, full diet. Aperient repeated. On the 5th of February he left the Hospital cured, his bowels having acted daily, and he had not the slightest pain or uneasiness about the abdomen; urine passed freely without pain, and normal.

CASE IX.—*Case of incised throat (suicidal) in which a large opening remained permanently.*

(Under the care of Mr. Curling.)

(*Reported by Mr. F. M. Mackenzie.*)

Francis M., an Italian, age 20, a confectioner by trade, was admitted into the London Hospital, under Mr. Curling, at half-past seven A.M., May 9th, 1865, with an incised wound of the throat.

When first seen he was apparently insensible, with face and extremities cold, and pulse hardly perceptible at the wrist. There was a large wound across the throat, measuring five inches in length, which gaped widely, owing to the position of his head. It was then seen that he had cut through the thyro-hyoid membrane, opening extensively into the pharynx. No large vessels, however, were wounded. The left carotid artery was visible, and a part of the pneumo-gastric nerve of same side.

An enema of brandy was administered, and all the usual measures for collapse resorted to. He rallied in about an hour, and though in a very low condition gradually got better by the evening. It was then ascertained, that jealousy had prompted him on that morning to attempt, first his wife's, and then his own life; but in neither attempt had he been completely successful. About seven o'clock P.M., he attempted to swallow some liquid, but it all escaped through the wound. Nor was he more fortunate with solid food. A tube was therefore introduced through the wound, as he refused to allow it through the mouth, into the stomach, and a pint of beef-tea with brandy, and laudanum administered.

May 10*th*.—He was much better, but still unable to speak or swallow. It was deemed inadvisable to do more to the wound than to bring the edges of its extremities together with sutures. He was propped up in bed, and his head brought well forward so as to prevent any gaping of the wound.

It was necessary to feed him through a tube four times a-day, and his diet for the first twenty days was as follows:—

Nine A.M.—A pint of milk, with two eggs beaten up in it.

One P.M.—A pint of strong beef-tea, with wine or brandy ʒiv. in it.

Six P.M.—The same.

Ten P.M.—The same as in the morning.

The introduction of food into the stomach was always attended or followed by a profuse discharge of clear saliva, sometimes as much, as four ounces, from his mouth.

11*th*.—More cheerful, and in every respect better. Troubled with a cough which distressed him somewhat. As his bowels were confined he was ordered an aperient.

12*th*.—The wound looked healthy, and had begun to close a little, but the frequent introduction of the feeding-tube inter-

fered with the healing process.   He could articulate a little, but not plainly.

16th.—The tube was now introduced through the mouth.   His general condition good.

20th.—The wound has considerably decreased in size.   He was now able to speak tolerably plainly, and to swallow food of himself, but not in sufficient quantity to support life.

25th.—Progressing favourably.

29th.—The wound much smaller.   He was now fed only twice a-day through the tube, being able to swallow soft food.

June 8th.—No longer fed through tube.   His diet was chop, eggs, light pudding, brandy ℥ij., porter Oij.

The wound is about one inch and a-half in length.

13th.—He was now allowed up, and seemed in tolerable health. He was, of course, unable to speak distinctly.

20th.—The wound was three-quarters of an inch long, and the edges seemed to be attaching themselves to the hyoid bone.

He was discharged in tolerably good health.

He was subsequently brought to trial for the attempt on his wife's life.   A verdict of temporary insanity having been returned, he was committed to a lunatic asylum, where he soon afterwards died, but the particulars of his death have not been ascertained.

Case X.—*Incised throat (attempted murder); complete division of the trachea; recovery with membranous stricture of the trachea; subsequent death from contraction of the fistula.*

(Under the care of Mr. Curling.)

(*Reported by Mr. F. M. Mackenzie.*)

May 9th.—Elizabeth M. (wife of the last patient), æt. 21, was admitted at the same time as her husband, with an incised wound of throat, opposite the third tracheal-ring, about three inches and a-half long, and extending completely through the trachea.   She was suffering much from dyspnœa, and was unable to speak.

She was placed in a warm room, and the edges of the wound brought together with sutures.

10th.—The dyspnœa had abated; in other respects she was much the same.

11th.—On this day the fluids taken at breakfast, were observed to escape through the wound ; this continued for two or three days, and then ceased, the glottis having recovered sensibility.

16th.—Going on well; occasional dyspnœa ; wound closing.

19th.—Extreme dyspnœa; the patient almost asphyxiated ; the introduction of a tracheotomy tube soon gave relief; it was kept in.

23rd.—An attempt to dispense with the tube (as the wound was closing) caused such extreme dyspnœa that it had to be abandoned.

June 6th.—The wound had now closed, excepting where the tube was introduced.

20th.—On this day she was made out-patient, having quite recovered, excepting the necessary continuance of the tube.

In order to obviate this, Mr. Curling had previously had a tracheal tube with an opening in the upper surface, introduced. The outer end of this was plugged, but the patient could not then breathe. Mr. Curling thought this might be due to spasm of the glottis, in part depending on the will of the patient, as she was evidently afraid of any experiment being made. He accordingly directed that she should be placed under the influence of chloroform, and the attempt renewed. However, the direct inhalation of the chloroform through the tube, produced such violent paroxysms of coughing, that this had to be abandoned. She was therefore dismissed, wearing an ordinary double tracheal tube, and suffering no inconvenience, excepting the loss of voice.

From this time nothing was heard about her, until on Friday, March 30th, 1866, when, late in the evening, she came to the Hospital, suffering from extreme dyspnœa. It was understood from her, that of late, she had had occasional difficulty of breathing, but never so severely as to alarm her.

She was admitted into a medical ward, and after being in the ward for a short time, recovered somewhat, and passed an easy night. Next day (*March 31st*) she still continued better, but about three o'clock the dyspnœa suddenly returned without any apparent cause, and rapidly became worse. The medical officer, on being summoned, found her already dead. The tracheal tube was removed, and the feather of a pen inserted for some distance without encountering any obstruction. Artificial respiration was tried, but ineffectually, as she never breathed again.

April 2nd.—On this day a *post-mortem* was made, and the thoracic viscera with the trachea removed *en masse*. The lungs and heart were healthy, except some slight congestion of the former. The trachea and bronchi were opened posteriorly. The mucous membrane was found throughout congested and thickened, particularly at the seat of the wound, so as even to materially lessen the calibre of the tube.

At the lower border of the thyroid cartilage, the larynx was found to be obstructed by a membrane reaching across from side to side, and directly continuous with the mucous membrane lining the part of the larynx above it.

In this examination, nothing was found to account for the paroxysms of extreme dyspnœa during life or for her sudden death. The occlusion of the larynx may have been due to the union in the middle line of the divided edges of the mucous membrane, above the wound. Owing to the loose connection of this membrane to the walls of the trachea, these would be easily separated from them, by the efforts of expiration, causing the air in its upward course to force itself between ; and, as inspiration in this case took place through the artificial opening in the trachea, there would be nothing to cause them to return to their natural position.

If this was the cause of the occlusion, it would be advisable, in any similar case, to endeavour to secure the divided edges of the mucous membrane to the margins of the wound, and so leave a fistulous opening which might afterwards be closed by a plastic operation.

CASE XI.—*Recovery after probable fracture of base of skull.—*
Temporary paralysis of several cranial nerves.

(Under the care of Mr. Hutchinson.)
(*Reported by Mr. F. M. Mackenzie.*)

Walter D., aged 24, drayman, was admitted on the 9th of August, 1865, in the following condition.

He could walk, but with a staggering gait, was apparently very stupid, and answered any questions put to him in an indistinct and wandering manner. There was blood upon his face and left ear, which could be traced quite into the tympanum, from which blood actually flowed during examination. He had also internal strabismus

of the left eye which his friends declared he had not had before the accident.   His pupils were equal and sensitive.

He stated that while carrying a nine-gallon cask on his shoulder down some steep steps, he had slipped and fallen, the cask striking his head at the same time that his head came in contact with the ground.   He was insensible for half-an-hour, and on his attempting to rise, blood was seen to come from his left ear, while there was ecchymosis of the right conjunctiva and the surrounding skin of the orbit extending backwards.   He felt great pain in his head and vomited once or twice.   He had, nevertheless, managed to get home after some time, but his strange manner, unsteady gait, and the bleeding from the ear still continuing, induced his friends to bring him to the Hospital.

He was ordered to bed, and ice applied above the left ear.

August 10*th.*—He had passed a tolerably quiet night : still complained of headache.   He had a distinct recollection of the accident, and did not seem in any degree confused.

12*th.*—Headache still continued.   There was a copious serous discharge from the left ear, and he was completely deaf on that side. He also complained that every thing he looked at now appeared double.   A blister was ordered to the nape of the neck.

13*th.*—Rather better.   It was noticed that paralysis of the seventh nerve on the right side was coming on, evidenced by inability to close the right eye or use the right levator labii superioris alæque nasi muscle, by the mouth being drawn to the left side, and by his being unable to whistle or keep his lips closed while attempting to fill his cheeks with air.   There was no want of symmetry in the soft palate, nor anæsthesia of the face.   There was now internal strabismus of the right side also, as well as of the left, which had existed from the first.   There was slight drooping of the left eyelid.

Ordered—a purgative draught.

August 15*th.*—Much the same.   The discharge still continued. Paralysis more marked.

18*th.*—Rather better.   Headache still continued.   A blister behind the left ear was ordered.

20*th.*—Still the same.   The blister was repeated.

21*st.*—Was relieved by this and slept better.   He could now open the left eye better, but his hearing was not improved.

Ordered a blister to the nape of neck.

22nd.—Much better. Paralysis had decreased. He could whistle, though feebly, and shut both eyes well. Mouth still slightly drawn to the left side, and left eyelid still drooped, but he could open both eyes widely when desired. He said that he could see better with the right than with the left eye.

25th.—Always has some headache on waking. Still some discharge from the left ear. Paralysis of the right sixth and seventh nerves almost gone. Internal strabismus of left eye remained. He could not hear the ticking of a watch on left side.

September 5th.—Some pain in head, darting at times inward from left temporal region. Still some discharge from left ear, and total deafness on that side. Paralysis of the right sixth and seventh nerves barely apparent, and distinct strabismus of left eye. On this day he was made out-patient.

He afterwards attended as an out-patient under Mr. Hutchinson's care at the Ophthalmic Hospital, Moorfields ; and for the following additional notes I am indebted to to the courtesy of Mr. Waren Tay.

" *October 30th.*—Walter D. comes to the Ophthalmic Hospital, Moorfields. He has still slight but evident convergence of the left eye, due to weakness of external rectus. He cannot turn the left eye outwards as far as he can the right. When looking straight before him at an object at a considerable distance (20 feet) he sees two.

" On putting a coloured glass before his right eye, the right image which is in the proper position is coloured.

"On putting the same glass before the left eye, the left image is coloured. There is no doubt about this, and it bears out the slight convergent squint of the left eye, the images not being crossed as is the case in divergent squint.

" Objects near him he sees singly, as he can converge his eyes well enough.

" He hears a watch placed at an inch from the left ear, and at three inches from the right.

" I can detect no difference between the two sides of his face. He shuts both eyes equally well, and frowns equally on both sides. Sensation is good.

" He sees well with either eye. He complains of pains in

the back of his head, and says that any slight jarring makes it worse.

"*November* 27*th*.—He has now quite lost the symptoms mentioned in previous note."

The chief peculiarity in the above case is the occurrence of paralysis, gradually commencing, and more gradually subsiding, of the sixth-and seventh cranial nerves of right side.

A very similar case of suspected fracture of base of skull was admitted into Cambridge ward, under Mr. Curling, December 24th, 1865. In that case there were some slight tokens of paralysis on the left side, observed immediately after his admission, on which side there was also a serous discharge from the ear, but after the lapse of a few days, marked paralysis of sixth and seventh cranial nerves of right side appeared, and very gradually decreased; not having altogether vanished at the period of the man's discharge from the Hospital. These symptoms, so similar in both cases, suggest the probability of lymph having been effused and subsequently absorbed.

CASE XII.—*Case illustrating the value of the operation of puncture of the bladder for retention of Urine, with large perinæal abscess consequent on old-standing traumatic stricture. Recovery with permeable urethra.*

(Under the care of Mr. Hutchinson.)

(*Reported by Mr. F. M. Mackenzie.*)

Robert C., aged 64, was admitted June 3rd, 1865, suffering from retention of urine. He was exceedingly ill, and had a large abscess in the perinæum. The following history was obtained subsequently. He stated that twenty-five years before, he, being in the Police Force, had, while in pursuit of a thief, fallen over a post, and received a wound in the perinæum, from which there was considerable hæmorrhage. He was then taken to Guy's Hospital, faint from loss of blood, and was told that the wound was "connected with the passage." A catheter was passed and tied in; some abscesses, which afterwards formed, were opened, and the wound healed. From that time he suffered no inconvenience, until about three years ago (1862) when he noticed that he could only pass a small stream, and that at times

his water dribbled from him. For this he went to the Metropolitan Free Hospital. Mr. Hutchinson there passed a No. 2 catheter, and as the incontinence was in a short time greatly lessened, he ceased to attend. It again returned, but he neglected it, and so continued for about twelve months, when he " felt a sort of gathering," which by pressing on the urethra, had now caused complete retention. Such was the account he gave of himself.

The House-Surgeon attempted to pass a No. 6 silver catheter, but, about two inches from the meatus, a stricture was encountered, which prevented its further progress. No. 2 was then introduced and was with some difficulty got through the stricture, when a small quantity of purulent urine escaped. As a second stricture prevented the introduction of the instrument into the bladder, he was ordered to have a warm bath, and to take croton-oil.

June 4th.—He had not passed any urine, but was in intense pain. There was a large swelling in the hypogastric region, very tense and dull on percussion. Mr. Hutchinson tried to pass a catheter, but to no purpose. He then, with some difficulty succeeded in introducing a Syme's perinæal staff through the first stricture, up to the shoulder, cut down in the middle line, and opened an abscess containing purulent urine, in which the staff lay bare for about two inches in extent. As the urethra could not be traced beyond this, Mr. Hutchinson decided upon puncturing per rectum, by which method about three pints of urine were withdrawn. The canula was tied in, and he was ordered a dose of laudanum.

June 5th.—He had been completely relieved by the operation. Urine passed both through the perinæal wound and the canula.

10th.—Urine passed, on this day, through the meatus, as well as through the wounds, and slightly by the side of the canula.

14th.—Canula removed.

16th.—The wound in perinæum has nearly healed, the urine passing chiefly through the urethra.

18th.—Mr. Hutchinson tried to pass No. 3 catheter, but experiencing some difficulty at the second stricture, did not persevere.

The urine still partly escaped per rectum, and the patient was unable to retain it for more than an hour. He continued in this way with but little change, except the gradual increase of urine passed through the urethra until—

July 10*th*.—When Mr. Hutchinson succeeded in passing Nos. 3 and 5.

13*th*.—No. 7 was passed with some difficulty. He was now able to retain his urine for about three hours.

17*th*.—On this day he asked for permission to go out, and did not return. He was then able to retain his urine for about five hours. Very little escaped through the perinæal wound, and none per rectum.

CASE XIII.—*Fracture of several ribs, and rupture of the heart in a child.*

(*Reported by Mr. F. M. Mackenzie.*)

The following case is of interest, partly as an instance of rupture of the heart, and partly on account of the rarity of fractures of the ribs in children:—

Sarah H., aged 6, was brought into the London Hospital dead. She was supposed to have been run over.

At the *post-mortem* examination, some ecchymosis was found, corresponding in situation to the sixth and seventh ribs of left side. On opening the thorax, the fifth, sixth, and seventh ribs on that side were found to have been fractured near their anterior extremities. The pleural cavities, lungs and pericardium, were uninjured; but this latter, when opened, was full of blood; the right ventricle of the heart having been ruptured. No other injury had been sustained.

CASE XIV.—*Large and rapidly spreading epithelial cancer of the cheek.—Excision.—Recovery.*

(Under the care of Mr. Curling.)
(*Reported by Mr. F. M. Mackenzie.*)

Charles P., aged 40, painter by trade, came to the London Hospital November 14th, 1865, with a large granulating sore on the inner surface of the left cheek; the edges of the sore were warty, and scrapings from this were examined by Mr. Little, microscopically, and pronounced by him to be epithelioma.

Mr. Curling removed the growth by an incision prolonged from the angle of the mouth to the vertical ramus of the jaw. In the

course of the operation the facial artery was cut across and tied. The wound was left open, lest hæmorrhage should occur. The edges were afterwards brought together with harelip pins; the wound healed by the first intention rapidly, and the man quitted the Hospital within a fortnight from the time of the operation.

CASES XV., XVI., and XVII.—*Three cases of dislocation of the femur.—Reduction by manipulation in all.*

(*Reported by Mr. F. M. Mackenzie.*)

The following cases illustrates the plan almost always adopted with success at this Hospital :—

Case 1.—Margaret W., aged 14, was brought to the London Hospital, July 14th, 1865, with dislocation of the left femur on to the dorsum ilii.

The symptoms were, intense pain in left hip and knee; decided shortening of the limb on measurement from ant. sup. iliac spinous process; foot inverted and resting on right instep; knee slightly flexed; and the axis of left thigh directed across lower third of right. The trochanter could be easily felt, but the head of the bone could not. The accident had occurred by her falling on her right side, while running : her brother, with whom she was playing, falling over and upon her.

She was at once put under chloroform. The pelvis was then steadied; the leg flexed on thigh; the thigh adducted and flexed on abdomen; abduction was then commenced, and during this the head of the bone slipped into the socket. There was no difficulty in the reduction.

July 20th.—Within six days she was found walking about the ward without leave, suffering no pain, and being but very slightly lame.

27th.—Discharged.

Case 2.—John R., aged 43, cooper by trade, was brought to the London Hospital, February 1st, 1866, with dislocation of right femur on to the dorsum ilii.

It had been caused by timber falling on his back while he was in the act of stooping. The symptoms were the same as in the last

case.   He refused to take chloroform ; reduction was effected in the
same way as above described, with great ease, and the man quitted
the Hospital perfectly recovered within nine days.

Case 3.—William E., aged 23, boiler-maker, was brought to the
London Hospital, February 22nd, with dislocation of left femur on
to the dorsum ilii.

The symptoms were the same as in the last two cases.   An iron
wheel weighing one ton and a-half had rolled against him, knocking
him down, and then falling on his left thigh.   Some difficulty was
experienced in getting him fully under the influence of chloroform.
Reduction was tried, as before described, but, owing to the rigidity of
the muscles, many attempts were ineffectual ; the head of the bone
again and again slipping back unto the dorsum ilii.   It was at last
accomplished by slowly abducting and then gradually extending the
limb.   He afterwards felt some pain in the gluteal region, but this
gradually wore away, and—

March 8*th*.—In a fortnight he was discharged.

CASE XVIII. *Extensive burn.—Destruction of a portion of the rec-
tum and urethra, with contraction of the cicatrix, and obstruction
to the passage of fæces for twenty days.—Operation.—Recovery.*

(Under the care of Mr. Adams.)

(*Reported by Mr. F. S. Colquhoun.*)

Edward H., a sailor, aged 41, was admitted June 23rd, 1865,
with the history that, on the 18th of February 1864, he slept in a
ship's cabin with a charcoal stove in it, and that the next morning
he was found sitting on this stove, just sensible, but unable to move,
and only able to speak in a whisper.   He was taken to Hospital
(at Shanghai) and remained there till January of this year, when he
left for England, and was admitted here on his arrival.   At that
time he was exceedingly ill, and in great distress, not having had his
bowels opened for seventeen days, but he had not vomited at all.
There was a large dense cicatrix occupying the whole of the peri-
næum and the posterior part of the scrotum, and extending for some
distance down either thigh.   In the middle line of the perinæum was

an orifice about the size of a pea, and from this urine constantly dribbled. He had no power over his bladder, nor did he know when his water passed. A large catheter was introduced down the urethra as far as the triangular ligament, but was here stopped by a dense mass. There was no other opening than the small one, above mentioned ; his fæces also having come through it as long as they passed at all. The cicatrix prevented his moving his right hip, excepting to a limited extent. A very shallow groove, drawn over to the right side, represented all that was left of the anal aperture.

He stated that, three days after his admission at Shanghai, a catheter was passed, and his urine drawn off, but after that the point of the instrument always came out in the perinæum. He has never had any action of the bowels, excepting after taking purgatives (generally croton-oil) and his motions and water have passed away without his knowing it. About four weeks before he left Shanghai the cicatrix began to contract, and so rapidly, that the circular aperture in the perinæum, according to his account three quarters of an inch wide when he sailed, was so small on the 6th of June (seventeen days before admission), that a watery motion passed for the last time. From that time he suffered intense pain in the abdomen. He took six drops of croton-oil within fourteen days without any relief.

On the 26th of June the man was so ill that Mr. Adams determined to enlarge the opening in the perinæum, and try and find the rectum. His abdomen was immensely distended and tympanitic ; he had so much pain that he could get no sleep at night ; his breath was most offensive ; some stinking urine dribbled away from him, and no fæces whatever escaped. He had not vomited.

A director was passed into the perinæal opening, and an incision, with a blunt pointed bistoury, made directly upwards in the middle line for about an inch. This gaped widely, at once a large quantity of a most offensive yellow fluid escaped, and continued to drain away for two hours after the operation. A large tube being passed for some distance up the bowel encountered no further obstacle. After this he did exceedingly well. There was great tendency to contraction which could not be overcome entirely by the use of bougies. By July the 5th he began to be aware when he wanted to pass fæces and urine.

On *August* the 26*th* he was discharged. At that time he was in very good health and very much relieved; he had command over his bladder and rectum, but his urine still passed at the perinæal opening. A very careful examination of the perinæum, &c., had been made, under chloroform, by Mr. Maunder with a view to a plastic operation, but it was decided that nothing could advantageously be attempted. An ivory plug was ordered for him to wear, and he was supplied with a bougie of the size of a No. 7, at the point, and increasing to that of No. 8, at the base. He was directed to pass this twice a week. Both the plug and the bougie were ordered with the view of preventing contraction.

With the notes of this case, Mr. Colquhoun sent a photograph of the man's buttocks, &c., and a portion of bone, which the man stated had come away in a poultice whilst he was at Shanghai. "It is about two inches and a quarter in length, convex, compact and uneven on one surface—concave and cancellous on the other, and looks like a portion of the ascending ramus and tuber ischii." Several other pieces came away, but were not kept.

CASE XIX.—*Acute necrosis of palate—Death.—Post-mortem not allowed.*

(Under the care of Mr. Curling.)

(*Reported by Mr. F. S. Colquhoun.*)

The subject of the following case, a woman aged 36, was admitted on the 4th of December, 1865.

Her face was anxious, her skin hot and dry, her pulse rapid, soft and feeble; her extremities were much hotter to the touch than her trunk; her breath was horribly fœtid, her tongue was covered with brown fur on the dorsum, and was red at the tip and edges. The teeth were all more or less loose ("she had not been able to bite on them for a week past"); her gums were spongy, swollen, very tender, and bled on the slightest touch; her face was swollen, and the parotid and submaxillary glands enlarged and tender, but there was no redness of the skin over them. On the under surface of the hard palate, in front, were two ulcers, each of the size of half a pea, and further back was a black, pulpy, fœtid mass, exactly resembling pasteblacking, and a probe passed through this, detected bare, softened

P

bone beneath.   Her voice was reduced to a husky whisper, and she could only, and with much difficulty, swallow liquids.

She had been confined three months before; had not felt well, and had been since under treatment by a medical man.   She said she had had caustic applied, and been taking pills and mixture.   She "had had three children—all alive and well, and had never had a miscarriage."   She was put on a fluid diet with wine, and ordered a gargle of Condy's fluid, and to take a mixture containing decoction of bark and chlorate of potash.

While in the Hospital she could take very little nourishment, and got very little sleep, owing to an intense burning pain in her throat, The fœtor of the breath, and the swelling of the mucous membrane, &c., increased, and early on the fourth day (December the 7th) she was seized with vomiting and general convulsions, and died.   The husband refused to allow an examination of the body.

This case, Mr. Colquhoun remarks, is interesting from the doubt as to the diagnosis.   There was no history of syphilis obtainable, and though the symptoms of the case resemble those of mercurial saliva-tion, death, and within so short a time, is unparalleled from that con-dition.   If a *post-mortem* examination had been allowed, some internal disease might have been found accounting for the death. He asks whether it might be a case of scarlatina maligna, without the rash.

CASE XX.—*Leucocythæmia.—Hypertrophy of spleen.—Phlebitis of veins of leg.—Death.—Autopsy.*

*(*Under the care of Dr. Davies.)
(Reported by Mr. F. S. Colquhoun.)

Thomas G., aged 22, was admitted on the 13th of March, 1866. He was rather emaciated ; his face was pale, but his lips were of fair colour.   His abdomen was much enlarged, and the left half was absolutely dull on percussion, this dulness being due to an enlarged spleen, which extended backwards as far as the spine, and in front passed beyond the middle line, and below reached nearly to the pubes.   The liver also was apparently enlarged, and pushed over and downwards to the right side, its lower margin

being felt about on a level with the umbilicus.   The circumference of the abdomen, opposite the base of the ensiform cartilage, was thirty-six inches and a-half; right half eighteen, left half eighteen inches and a-half.

The pulse was 116, weak and soft; his urine was acid, of sp. gr. 1015; deposited lithates, but contained no albumen.   He had no enlarged glands.

History.—He is unmarried, was born in Wales; has lived for the last seven years near the Isle of Dogs, but has never had ague. He first noticed the swelling between two and three years ago. It has increased rapidly during the last twelve months and has been painful: He worked till last May, when he had the small-pox.   He got over this, but afterwards his right leg swelled ; this passed off ; but last Christmas the left leg swelled, and has continued so since. The swelling in the side has been more painful, and got much larger during the last four months.

The blood, under the microscope, showed great diminution in the number of the red corpuscles, and a great increase in the number of the white ones, with a tendency in the former to run together in rolls.

He was ordered milk and beef-tea, with warm fomentations to the side, and a twenty-grain dose of quinine at once.   The next day, three grain doses thrice daily, and the side to be painted with iodine.   16*th*:—Twenty grains of quinine again administered.   17*th*: —Five grain doses of iodide of potassium were ordered.   19*th*.— Quinine thrice daily again.

Death took place a few weeks after his admission.

At the autopsy both liver and spleen were found greatly enlarged. In the spleen were masses of lardaceous deposit.

CASE XXI.—*Fracture of the right parietal bone.*—*Contusion and inflammation of bone.*—*Meningitis.*—*Death.*   *Autopsy.*

(Under the care of Mr. Little.)

(*Reported by Mr. F. S. Colquhoun.*)

Sarah H., aged 41, a cook, was admitted May 11th, 1865, with the history, that while ringing a dinner-bell, it fell a distance of

about forty feet, and struck her on her head. She was knocked
down and stunned by the blow. On admission, her symptoms were
those of the collapse stage of concussion; insensibility, pale, cold
surface, slow pulse, slow respiration without stertor, and absence of
reflex action.   There was no bleeding from either ear nor from the
nose.   A scalp wound, about two and a-half inches long, was found
on the right of the middle line in front, and extending backwards
towards the right ear.   The pericranium was stripped off, and the
external table of the bone appeared to be fractured and depressed;
the edges of the depression sloping towards each other (gutter de-
pression).. While the wound was being examined she appeared to
be recovering from the concussion, and began to resist.   Under
these circumstances, as there were no symptoms of compression, and
the concussion seemed passing off, Mr. Little merely removed one or
two spiculæ of bone, and decided not to trephine.   She was sent to
bed, with directions that she should be carefully watched; that cold
should be applied to the head, and a castor-oil enema administered,
Until the twentieth day she had had no untoward symptoms, except-
ing pain in her head, and that the wound had only healed slowly; but
on this day she became drowsy and stupid, and the pain was worse.
Her pulse was 60, and full.   From that date till May 23rd, she was
restless at night, and could scarcely be roused in the daytime; she
.then had a severe rigor, after which, she perspired freely.

May 24*th*.—The wound is noted to be entirely destitute of
granulations, and the bone is seen white and dry at the bottom.
She had six distinct rigors in the course of the day; could
be roused, but lay most of the time in muttering delirium.   The
right side of her face was much swollen, and an abscess was opened
near the right outer canthus, exposing dead bone. On the 25th, her
urine and fæces passed involuntarily for the first time, and her pulse,
instead of being 60, and full, was now 90, weak and thready.   Her
left arm and leg appeared weak.   Owing to the swelling, it was im-
possible to say whether the right side of her face was paralyzed or
not; but there was no marked distortion of the mouth nor
strabismus.

24*th*.—She had another rigor, the first since the 6th.

28*th*.—She was all but insensible, in a state of low muttering
delirium; urine and fæces passing unconsciously. Her pulse had

increased to 110. Her pupils were of normal size, equal, and sluggish. At 9 o'clock, P.M., she had a convulsion affecting the whole body. Her pulse was 120, and she was quite insensible.

29th.—Another violent convulsion at 9 o'clock in the morning; this time confined to the right side. She would constantly move the right arm and leg; never the left ones, but they did not appear to be completely paralyzed. Her pulse was 130, and very weak.

30th.—She had two more convulsions, and her left eyelid was noticed to drop. Until the first convulsion on the 28th, she could be roused with a little trouble; but 'from that time till she died, at 9 o'clock P.M. on the 30th, she was quite insensible.

Autopsy.—The examination of the head (the only part allowed to be examined) was conducted by Mr. Hutchinson.

There was a fracture of the vault, about an inch long, extending across the coronal suture, and a fissure passed downwards across the groove for the middle meningeal, then inwards through the greater wing of the sphenoid, and tailed off in front of the foramen rotundum. The internal table of the parietal bone was fractured and depressed to the extent of an eighth of an inch; but this depression did not seem to have injured the dura mater at all. Fissures passed in several directions from this part. The bone, for an inch round the fracture, was of a greenish colour, and there was a furrow marking out the diseased portion; but at one place the disease extended another inch further, and limiting this, there was a second furrow. The calvaria is now in the London Hospital Museum. (*See* p. 369 of the second volume of the *London Hospital Reports.*)

On removing the calvaria a quantity of pus escaped, and the anterior two-thirds of the outer surface of the dura-mater was covered with thick greenish-yellow pus and lymph. A thrombus of a pale pink colour, softened in parts, was found in the superior longitudinal sinus. The anterior two-thirds of the right hemisphere, its upper surface, were covered with greenish-yellow lymph, and so also was the under surface of the parietal arachnoid. The effusion on the visceral arachnoid seemed in local patches as if restricted by surrounding adhesions. The arachnoid, at the base of the brain, was everywhere covered with lymph. The upper surface of the left hemisphere was free from lymph; but the posterior half was covered with a thin clot of blood of a rust-colour, adherent to

the under surface of the dura mater, and evidently undergoing absorption. On this hemisphere, corresponding to the squamous bone, were one or two patches of contusion. With the exception of the right optic nerve anterior to the commissure, the nerves did not seem to be involved. The cortical substance of the brain beneath the effused lymph was superficially discoloured of a greenish tint.

CASE XXII.—*Chronic disease of the left hip-joint.—Dislocation of the head of the femur on to the dorsum ilii.—Profuse suppuration.—Hectic.—Amputation at the joint with removal of portions of the acetabulum.—Patient still in the Hospital.*

(Under the care of Mr. Curling.)

(*Reported by Mr. F. S. Colquhoun.*)

On the 17th of January, 1865, Mary A. P., aged nine, was admitted with the ordinary symptoms of incipient disease of the left hip-joint. She was kept at rest in bed, but after a time had severe attacks of pain, which were treated with iodine paint, over the joint, and morphia at night. On the 3rd of June she was discharged, able to walk on crutches, and without pain in the hip, for Brighton, where she improved, until, unfortunately, she was pushed off a form, and struck her hip a severe blow on the ground.

She was admitted again September 20th, with an abscess pointing over the great trochanter and evidence of serious disease in the joint. Abscesses formed in various parts; were opened and discharged freely; sinuses were left. She became hectic; extensive bed-sores appeared; the head of the femur was dislocated on to the dorsum, and finally, after a consultation with his colleagues, Mr. Curling amputated at the hip-joint, as the only means of saving the child's life. He also removed two small, loose, carious pieces of bone from the acetabulum. This was on the 7th of February.

On the 12th of February "the wound was healthy, discharging thick healthy pus, and was free from smell of any kind. All the hectic symptoms had disappeared."

On the 7th of March the ligature came away from the main vessel. The girl has since steadily improved in health, and for more than

a month has been allowed to get up. At present (August 3rd) the operation wound has nearly healed. She is allowed to move about on crutches, and will shortly be discharged. Her slow recovery was caused by the large size of the bed-sores, and the loss of skin from sloughing and ulceration near the trochanter.

Mr. Colquhoun remarks· that " the wound has been dressed chiefly with dry cotton wool, but sometimes the cotton-wool has been soaked in the lotions ordered. For the first month dry wool only was used, and this appeared not only to be a very good absorbent, but also to stimulate the parts. Poultices have never once been used, and thus by keeping down the discharge (instead of favouring its formation by warmth and moisture), the child's strength has been saved and hectic avoided. The bed-sores were present at the time of the operation; no fresh ones have formed. She has been kept constantly on a water-pillow, the back being well supported with cotton-wool. For some time past the sores have been surrounded with felt plaster, which has been useful, not only in keeping off pressure, but in protecting the surrounding skin. The compound tincture of benzoin has been applied lately, and this has had a very good effect."

LITHOTRITY SYRINGE.

By C. F. MAUNDER, F.R.C.S.

In some cases in which lithotrity has been performed, either the natural efforts of the patient are not equal to expulsion of the fragments or some time is necessary to its accomplishment; the process being also often attended by great suffering. To be independent then of natural effort, to save time and lessen pain Mr. Clover suggested the employment of an instrument to withdraw débris from the bladder- by means of suction. This same principle is embodied in the instrument made for me by Ferguson of Giltspur Street, and illustrated by the annexed figure.

It consists of a half-pint elastic bottle fastened by its mouth to a glass bottle, and from this latter depends a glass receptacle. To the other end of the glass bottle catheters of varying calibre can be fixed. Each catheter has a large fenestra near its blind extremity and must be provided with an elastic stilette large enough to fill it. When the catheter is either introduced or withdrawn from the bladder the stilette should be used to close the fenestra. The instrument is to be used thus—The stone having been crushed; a catheter (the largest the urethra will transmit) with the stilette in it is to be passed into the bladder and the stillette removed when the fluid contents of that viscus are to be permitted to flow out. The bottles and receptacle having been filled with warm water are to be adjusted to the extremity of the catheter and on gently compressing the elastic receiver the fluid will slowly pass into the bladder. As soon as from four to six ounces of water have passed in, compression must cease and the elastic bottle being allowed to refill the water will rush out

of the bladder and bring
fragments of stone with it.
These latter will fall into
the receptacle below and
will remain there, as in a
trap, while the operation
of injection is repeated as
often as may be desirable.
Thus, the product of each
crushing operation is re-
moved.   Before withdraw-
ing the catheter the stilette
must be reintroduced in
order to close the fenestra
and to dislodge any frag-
ment of stone that may be
fixed there.

The instrument is es-
pecially applicable to cases
where inability to expel
débris arises either from
loss of contractile power in
the muscular coat of the
bladder or from mechanical
obstacle caused by enlarged
prostate. Also, in instances
in which the   calculus
being hard and brittle and
the fragments consequently
sharp and angular, the suf-
ferings of the patient when
expulsion is left to natural
efforts, are excessively se-
vere.

The subject of a small cal-
culus may be cured at one
sitting by the aid of this
mode of removing débris

FIG. 8.
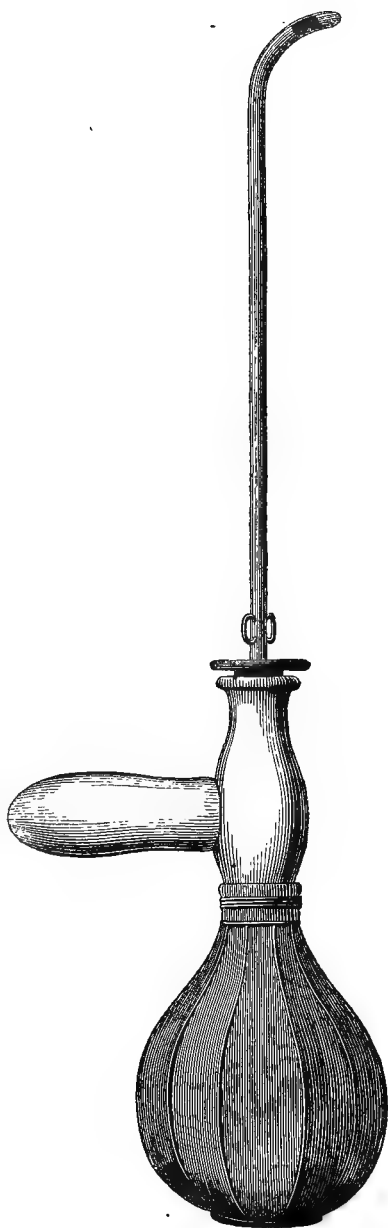
GASTROTOMY WAS PERFORMED FOR STRICTURE OF THE ŒSOPHAGUS.

UNDER THE CARE OF MR. CURLING.

ANALYSIS OF CASE.—*Carcinomatous stricture of œsophagus, producing almost complete occlusion.—Gastrotomy.—Great relief afforded to the extreme hunger and thirst.—Death from exhaustion thirty-one hours after the operation.—Sectio cadaveris.*

(*Notes by Mr. F. S. Colquhoun.*)

William G., aged 57 years, was admitted into the London Hospital on January 30th, 1866, under the care of Dr. Davies.

History.—He states that he has followed the sea for the past forty-four years; has never had syphilis, has been exposed to great hardships; does not remember ever to have had an injury to the throat, and has only suffered from it for last four weeks; has lost flesh and strength very rapidly. He is now very desponding and anxious about himself.

Symptoms during first fortnight.—Body much emaciated; face sallow, haggard, and anxious, marked with deep lines about mouth and eyes. Eyes deeply set in the head; conjunctivæ muddy looking; mouth moist and full of saliva, which he says he is constantly obliged to spit out from the quantity secreted; lips firmly set, and angles of mouth drawn down; teeth coated; tongue covered with thick dirty fur; breath smells sour and very offensive. Complains of feeling very hungry and thirsty, with constant craving, and sinking feeling at epigastrium; and he states, that for the last four weeks he has vomited all solid food immediately after he has taken it, and that it is with the utmost difficulty he can swallow liquids, and that the act of swallowing always gives him intense pain. He states that

the food stops suddenly opposite the episternal notch usually, but sometimes it seems to be stopped about the pomum Adami.   The vomited matters consist of the food taken, which is rejected, unaltered, mixed with mucus and streaked with blood; blood has been observed only once since his admission, but he says that he has seen blood frequently before.   No tumour can be felt anywhere in the neck, nor can anything abnormal be detected by making him swallow; the abdomen is quite flaccid and somewhat retracted.   Stethoscopic examination of throat, chest and abdomen gave the same negative result.   Bougies of all sizes (even a special, small, and flexible set, which were ordered for him) stopped abruptly, without any perceptible spasm, about ten inches down, reckoning from the gums.   Pulse varying from 90 to 110, weak and fluctuating.   He was ordered to be kept strictly at rest, to have milk, beef-tea, and eggs.   He was allowed, at his urgent request, to get up; he managed with a great deal of difficulty to swallow the milk and beef-tea, often rejecting the greater portion of it.   The bowels acted moderately after an aperient draught.

February 12*th.*—During the whole of this time he took his food by teaspoonsful at a time, frequently vomiting, and complaining of urgent hunger and thirst.

On the 13th vomiting became worse; he was ordered Mist. Sal. efferves. ℥j. 4tis h.

16*th.*—Vomiting still continuing.   Food by the mouth was ordered to be stopped, and a nutrient enema of beef-tea and eggs; to be given night and morning.

18*th.*—Vomiting no better; bowels acted slightly after a dose of house-medicine.   Ordered three grains of oxalate of cerium every four hours.   Continued enemata.

21*st.*—Vomiting still continued; oxalate of cerium gave no relief.

23*rd.*—No better; weighed, and found to have lost nearly eleven pounds weekly, since his admission, he now weighed only eight stone seven pounds.

24*th.*—Vomiting still continued.   Ordered Mist. Creasoti ℥j. 2ndis horis.   Ordered fish at his own request.

27*th.*—Kept scarcely anything down long, and complained a good deal of hunger.   He was ordered four ounces of very finely

minced meat daily, in addition to other diet, in the hope that some of this might reach the stomach.

March 9th.—Vomiting was almost constant; scarcely any food reached the stomach, and scarcely any liquid either.   Vomit examined microscopically, found to contain yeast fungus, but neither sarcinæ nor blood.   He was ordered minced-meat, artificially digested by means of pepsine and hydrochloric acid; he managed to get a little of this down, and seemed to relish it, but this very shortly, like everything else, excited vomiting.   He was exceedingly thin and weak; but still able to move about.   All food, by the mouth, was ordered to be discontinued, and enemata only to be given.   All medicines were stopped, as none of them had given the slightest relief.   The operation of gastrotomy was now again proposed to him, as it seemed to be the only means left by which any relief could be afforded.   The operation had been mentioned to him about a fortnight after his admission, but he would not hear of it then, so the matter was dropped ; he now, though still reluctant to have it performed, said if nothing more could be done for him, he would undergo it.

13th.—Worse in every respect; vomiting constant, and he was weaker ; pulse feebler, and had a tendency to intermit.   Countenance more depressed, and thirst extreme.   Ordered iced milk.   Dr. Davies requested Mr. Curling to see him in reference to gastrotomy.   Mr. Curling, after examination of the patient, requested a consultation with his colleagues next day.

14th.—Some difference of opinion existed as to the immediate necessity for the operation, and eventually the man's repugnance to submit, led to its postponement.

On the 15th, he was not nearly so well, vomiting constant, pulse weak, and fluttering.

16th.—Much worse ; surface cold; much weaker ; pulse intermittent.   Mr. Curling again saw him at half-past three o'clock in the afternoon, and at the man's urgent request, decided on performing the operation.   He had rallied after taking a little brandy ; the man's sister (his only surviving relative) also urgently begged that the operation might be performed.   The man was removed at once to the operating table, and placed on his back.   Mr. Curling decided that chloroform should not be given for fear of exciting vomiting,

but ether spray was applied over the line of incision. Mr. Curling made an incision about three inches in length, extending from over the end of the seventh rib vertically downwards. Along the outer border of the rectus, there was only a trace of subcutaneous fat, and scarcely any bleeding occurred. The transversalis fascia and peritoneum were soon exposed, and divided on a director, and the cavity of the abdomen opened.

The stomach, blanched and contracted, was at once recognised. The coats were seized with forceps and drawn into the wound, and an opening about three-quarters of an inch long made in it with a pair of scissors. The edges were then attached to the margin of the external wound by five thick silk sutures, care being taken to prevent any escape of blood into the abdominal cavity. The external wound above, and below the opening in the stomach, was closed by metallic sutures.

After the operation the man spoke cheerfully, and he did not appear to suffer at all from shock, and only complained of smarting in the wound.

March 16*th*.—The operation, including the etherisation, occupied about twenty minutes. He was removed to bed, and Mr. Curling ordered him to be fed every half-hour by means of a catheter introduced through the wound into the stomach, and about a table-spoonful or two to be injected slowly. A quarter of a grain of morphia was ordered to be administered hypodermically immediately. Half-an-hour after the o peration, $\mathrm{3j}$. of warm milk was injected by means of a glass-syringe into the stomach, this seemed to hurt him a good deal. On removal of the catheter some viscid, intensely acid fluid welled out from stomach, this seemed to irritate skin and wound wherever it touched, and was probably gastric juice from its intense acid reaction to Litmus paper. He sucked ice constantly, and seemed very fond of it. Pulse 90, very weak. Surface warm. He was fed at intervals of half-an-hour with milk, beef-tea, and wine and egg, alternately, till 10 P.M. ; these feedings did not seem to cause him any pain, the same acid fluid escaping each time the catheter was removed, great care being taken to prevent its touching surrounding parts. The edges of the wound to which stomach was attached, had sunk in very much, narrowing the aperture, and thus a good deal of tension was thrown on the stitches.

16*th.*—At 10 o'clock, Dr. Woodman ordered an enema of beef-tea ℥iv., eggs ij., wine ℥ii., to be given per rectum, as he had been accustomed to it.   He went comfortably to sleep till 11 P.M., when he roused up, and asked for some ice; he was fed by the stomach, ℥ij. beef-tea being injected; he spoke cheerfully, said he felt comfortable, was not hungry, and not nearly so thirsty.   Surface warm. At 12 o'clock he went to sleep again, and slept comfortably till 3 A.M., when he awoke, and again asked for ice, which was given him, dipped in brandy.   An injection of wine and beef-tea introduced into the stomach; he complained a good deal after this, so another quarter of a grain of morphia was given hypodermically.   This gave him great relief, and in fifteen minutes after its administration he was asleep again; he slept soundly from 4 o'clock A.M. till 6, when another injection of beef-tea, with brandy, and two eggs was administered by the rectum.

17*th.*—From this period he continued gradually to sink, and he died of exhaustion, at half-past eleven, thirty-two hours after the operation.

An enema of beef-tea, wine and eggs had been given about an hour before he died.   No vomiting had occurred throughout, once or twice he retched, and a quantity of saliva mixed with water, which he had allowed to escape down his throat was rejected, but from the slight effort required to get rid of this it was probably lodged in the œsophagus between stricture and mouth, and had never reached the stomach.   From the wound itself no regurgitation of food took place, nor did the stomach make any movements or efforts to expel anything, and it did not seem to be at all irritated by the food introduced.

Sectio cadaveris, thirty-six hours after death.—Body extremely emaciated; surface, generally, pallid; abdomen discoloured and flaccid; both lungs were extensively emphysematous at their margins; heart loaded with fat; muscular structure softened; considerable atheroma of aorta and larger arteries.

Abdomen.—There was an opening just within the cartilages of the eighth and ninth ribs, corresponding to the opening made into the stomach during life; all the tissues around the incision were discoloured, and blood extravasated into them.   One of the upper sutures had ulcerated out.

Œsophagus.—About six inches from the glottis, and about four

inches and a-half from the stomach, there was a tight constriction which would barely admit a goose-quill. The posterior wall of the gullet was much thickened for about two inches, and on laying it open it was found to be extensively ulcerated, the ulcer having almost eaten its way into the right bronchus. The microscopic appearances resembled degenerated epithelioma, with an approach to colloid in the deeper layers. The stomach appeared free from disease, and the opening into it by the operation was on the greater curvature close to the cardiac end. There were no marks of peritonitis; the intestines were generally empty and flaccid; liver normal; no enlarged glands could anywhere be found.

MARRIAGES OF CONSANGUINITY IN RELATION TO DEGENERATION OF RACE:

By J. LANGDON H. DOWN, M.D., LOND.

PROBABLY no subject which has engaged the attention of the medical statist has given rise to more widely divergent views, certainly no inquiry on the part of the physiologist, has been productive of less practical results, than the one which heads this paper. There is a class, and probably a large one, which looks upon consanguineous unions as universally productive of evil, and where the worst consequences are not met with, regard them as mere exceptions to an all but universal rule. To some extent this opinion has permeated society, and although it has failed in preventing such unions the popular view has of late years been tending to a conviction that degeneracy of race is to be largely attributed to the union of blood-relations. Thus, Duvay of Lyons, asserts "that in pure consanguinity, isolated from all circumstances of hereditary disease, resides, *ipso facto*, a principle of organic vitiation."

On the other hand, a not inconsiderable section regard this conclusion with doubt, and teach that consanguineous unions may be effected with impunity. We may place, as representing this party, and in antithetical relation to that of Duvay, the assertion of Dr. Gilbert Child, that "the marriages of blood-relations have no tendency, *per se*, to produce degeneration of race."

The arguments of the former are drawn from examples of a somewhat isolated character, and, in the language of their opponents, "attempt often to prove too much." No one, I think, with a previously unbiassed mind, can read the numerous examples which are

cited to prove as the result of such unions sterility, deaf-mutism, idiocy, and other characteristics of degeneration, without coming to the conclusion that the cases from which they argue are selected ones, and that the cause they advocate is damaged by special pleading where there should have been judicial deliberation. Writing from a stand-point of observation which enables me to give an opinion on the subject, and having regard to a great deal that has been written, I cannot but join Dr. Child in his very just remark, " to say that all but half the children of the marriages. of cousins are idiotic, is simply to say the cases from which the statistics were drawn are not fair cases."

The arguments of the party of which I have placed Dr. Child as the exponent, are mainly based on observations on the results of the modern system of breeding among the lower animals, and to the examples furnished by the Hebrew race and the North American Indians.

The racial degeneracy, which it is the purpose of this paper to examine in its relation to consanguineous unions, is that congenital mental defect, which, manifesting itself in different varieties as to intensity, has received the name of idiocy,

My notes refer to 1138 cases of idiots, 753 being males, and 385 females, which I may say *en passant* is about the ratio, according to my experience, in which the sexes are affected by idiocy, viz., in the proportion of about two to one.

I have taken the records with every care as to accuracy, and from the number have excluded all cases in which there was impossibility in obtaining information or elements of doubt when obtained. Influenced only by these circumstances, I have eliminated 196 males and 90 females, leaving 557 males and 295 females, or a total of 852, on which the arguments will be based.

Of the 753 male idiots, 33 were the progeny of first-cousins; in two of these instances there was another element elicited, viz., in one case the mother was also the product. of first-cousins, and in the other the mother was the product of cousins-germain, involving, therefore, in these two cases, an increased intensity of blood-relationship. Three cases were the progeny of second-cousins. Four of third-cousins. In all, 40 cases out of 753, or only rather more than five per cent., could by any possibility have been due to consanguineous unions. Of the 295 females, 13 were the progeny of first-

Q

cousins, 3 were the children of second, and 4 those of third-cousins. In all, 20 among 295, or little less than seven per cent., could have been caused by the marriage of blood-relations.

The difference in the percentage of idiots, the progeny of cousins, between the male and female sex is remarkable, but may, I think, be explained by the existence of a preponderating cause of idiocy on the part of males over females, in the larger size of the male cranium at birth, and the consequent greater risk of injury to the cranial contents during parturition.

I am unable to speak with certainty how frequently the marriage of blood-relations takes place in an ordinary community, but I have made a careful inquiry into the family history of 200 persons, who are sane and healthy, collected from different districts, and who belong to different families, and I find only one was the offspring of cousins; being half per cent., and I learn that in that one instance he is the son of unusually healthy parents. Certainly, in his case, there is no symptom of either physical or mental degeneracy, and he would probably be selected from among the 200 as one of the most robust and vigorous.

I propose, now further, to inquire into the cases of idiocy from which my statistics are drawn, and endeavour to discover if there are any other factors, besides that of consanguinity to account for the manifestation. For this purpose I quote from the notes of 20 cases taken, without selection, from my portfolio, and which may, therefore, be fairly regarded as typical of the whole.

CASE I.—J. V. T., male, born in London, father and mother healthy and of sound mind, but first-cousins. The father's mother had hemiplegia at 73. Mother was frightened when six weeks advanced in pregnancy by seeing her mother with paralysis, and to this she attributes the idiocy of the son, who is a microcephale. Three sisters, all healthy. J. V. T. is the fourth, and last born.

CASE II.—M. M. Y., female, born at Calne, father and mother first-cousins. The mother's parents were also distantly related. The father healthy and of sound mind, but his brothers and sisters with consumptive tendencies. The mother died from tumour of the brain, several of her relatives died from consumption. M. M. Y.

is the second-born and a twin, the other twin healthy and of sound mind. This child was remarkably small when born, is deaf, and had fits for many years. She has one cousin who is demented from epilepsy.

CASE III.—A. E. V. S., male, born at Walworth. The father and mother were first-cousins. The father was delicate, sound in mind, but intemperate, his relations healthy. The mother healthy and of sound mind, had given birth to twins twice, her family generally consumptive. A. E. V. S. is the eighth-born, and one of his brothers died from consumption. The mother was frightened by a cat during the seventh month of her pregnancy, and was ill a week in consequence. She attributes the idiocy to her husband's habitual intemperance.

CASE IV.—M. A. S., female, born in London. Father and mother first-cousins. Father of sound mind, died from pulmonary hæmorrhage. One of his sisters died from consumption. Mother consumptive, has also lost one sister from consumption. M. A. S. is the fifth-born, and had four brothers and one sister, all have died from consumption.

CASE V.—F. H., female, born in Lancashire. Father and mother were second-cousins. The father healthy and of sound mind; his father lost his sight when a young man, (amaurosis?) two brothers died from consumption. Mother healthy and of sound mind, her aunt on father's side insane. The mother married twice, the first time to a person not related, and had three children, two girls healthy, and one boy who has epileptic fits. She afterwards married her second-cousin and had two girls, who are healthy, then a boy, who is decidedly idiotic, and then F. H., who has little or no mental power. F. H. is the seventh-born. Mother states that she believes the cause of the idiocy of the first idiot child was from fright, and that of the second from thinking of the idiocy of the former.

CASE VI.—C. E. H., female, born in Leicestershire. Father and mother first-cousins. Father is a clerk in holy orders, healthy now, but was very delicate when at college; his uncle was imbecile, his

father was eccentric and acquired drinking habits, his aunt died from phthisis. The mother is very deaf, her sister died from cancer. C. E. H. has three brothers and two sisters of average physical and mental power. She was the first-born, and during the pregnancy the mother had great anxiety about pecuniary matters. The forceps were employed at parturition, and the head was greatly crushed.

CASE VII.—J. C., female, born in Surrey. Father and mother second-cousins. Father had fits when a child, is very ailing, and feeble in mind. No family history. The mother not very strong, lost a brother from consumption. J. C. is the sixth-born, her eldest brother died from acute hydrocephalus, the rest are all bright although not very strong. The mother says she saw, when seven months advanced in pregnancy, a girl precisely like her daughter both mentally and physically.

CASE VIII.—J. T. B., male, born at Wingham. Father and mother third-cousins; father healthy and of sound mind, very deaf; his cousin became blind from study. Mother healthy, but all her relations consumptive. J. T. B, is the seventh born, and is a twin-child; his twin-sister is very intelligent, as are also another sister and eight brothers.

CASE IX.—E. P. C., male, born at Tiverton. Father and mother first-cousins; father died from Bright's-disease after five years illness; relations healthy. Mother healthy, but nervous; had bad health during her pregnancy, and was much distressed by her eldest child having croup in Paris, and not being able to procure a doctor. She had a very bad labour, owing to the large size of the child. There are two brothers and three sisters, all particularly intelligent. E. P. C. is the fourth-born.

CASE X.—W. G., male, born at Dorking. Father and mother were second-cousins. Father healthy, and of sound mind; has lost five brothers and sisters from consumption, and has one sister insane. The mother has had a fistula, is of sound mind. She was very low-spirited during pregnancy at the prospect of another child, with

limited means for the support of the family. W. G. is the fourth-born, and has had three brothers and two sisters, one brother died from scarlatina, one is rather delicate, the rest are healthy and intelligent.

CASE XI.—W. A. P., male, born at Peckham. Father and mother first-cousins. The father was healthy, but below the average in mental power; his relations were healthy. The mother has always been delicate, and is very nervous, had an aunt insane, all her brothers and sisters died young. W. A. P. is the eleventh-born, and has had four brothers and six sisters. The first-born, a male, is an idiot, one brother died of inflammation of the lungs, one of convulsions at a fortnight old. Four sisters are dead—two were twins, one died at birth, and the other twin-child, when ten days old, of fits, one died from fever ; there are two sisters and one brother living, who are all intelligent.

CASE XII.—W. R., male, born in London. Father and mother were first-cousins. Father has good health, but is very irritable and desponding ; his mother died of consumption, and he lost one sister from congestion of the brain. Mother healthy, has lost one sister from consumption, and has an uncle imbecile. The mother suffered severely from sea-sickness when in the fourth month of pregnancy. The umbilical cord was obliged to be divided before the birth, animation was suspended and had to be resucitated by artificial means. W. R. is the eleventh-born, has had eleven brothers and sisters, all of whom had average mental and bodily power.

CASE XIII.—R. S., male, born in London. Father and mother first-cousins. The father healthy, sober and steady, family healthy. The mother suffers from chronic bronchitis, sound in mind, and family healthy. The relative ages of father and mother at the birth of R. S., were 41 and 29. The labour was lingering, and ergot of rye given twice ; the head was misshapen, and the child made a strange noise when born. R. S. is the fourth-born, and has had one brother and seven sisters. One had no bone on one side of the head, and lived only two days ; four died at birth, but seemed all right. The rest quite healthy children. The first three born are the healthy

ones, the rest have all been defective or have died. The mother miscarried with a child with one leg.

Case XIV.—J. B., male, born at Tottenham. The father and mother were first-cousins. The father has good health, but is of low intelligence; his relations healthy. The mother is delicate, and lost a brother and sister from consumption. J. B. was the third-born, and had one brother and four sisters, one boy had fits and died from consumption, one girl died from epilepsy at seven years, the rest healthy and bright.

Case XV.—E. P., male, born at Bath. The father and mother are second-cousins. The father has average health, but is a drunkard, six of his immediate relatives stammer. The mother has very poor health, and suffers from uterine disease; two of her sisters died young from consumption. The mother was ill during the whole of her pregnancy, fell down stairs during the seventh month, was nervous, and was disturbed by hallucinations. E. P. was the second-born, and had three brothers and three sisters; one died of water on the brain, and one of scarlet-fever, and one of consumption. Three are idiots.

Case XVI.—J. A. V., male, born in London. Father and mother are first-cousins. Father is healthy, but his father was eight months in an asylum with mania, and recovered; father's mother very eccentric; his sister had spinal disease, and died from consumption. Mother healthy, but nearly all her immediate relatives consumptive. She had much trouble and business difficulties during her pregnancy. J. A. V. is the fourth-born, had two brothers and one sister who were intelligent.

Case XVII.—J. T. W., male, born in London. Father and mother are first-cousins. Father is a very weak and nervous man, faints frequently, and his whole bearing is like one suffering from mercurial tremor. The mother has good health, but is very nervous, her mother is also nervous, and bordering on being insane, one uncle died insane, and one cousin is imbecile. She fell downstairs when six months pregnant, and about the same time she was much frightened by her husband falling down in a fainting fit, which induced in her

uterine action and a considerable amount of flooding. J. T. W. is the first-born, and has had five brothers, one died from a fit during an attack of hooping-cough, one died from bronchitis, one is paralyzed on one side, and another is three years and a-half old, and cannot talk, is only just able to walk, and has a large head.

CASE XVIII.—E. H. H., male, born at Lewes, father and mother were first-cousins. Father is healthy, but irritable ; one of his sisters died from consumption, and another who also died from consumption was subject to delusions. The mother died from consumption, and had an uncle who suffered from dementia, thought to have been induced by drink. She was frightened two months before her confinement by stepping on an adder. The labour was lingering, and the child's head much distorted. E. H. H. was the first-born, and was born with animation suspended ; he had one sister only, who was prematurely born, and who died three days after her birth.

CASE XIX.—G. K., male, born at Woolwich, father and mother were first-cousins. Father is healthy, and of sound mind ; his relatives were of average health and mental power. Mother healthy, and of sound mind ; her mother was insane ; her aunt died in an asylum ; and another aunt's child suffers after every confinement from puerperal mania. G. K. was the second born, and had one brother and three sisters ; one sister is an idiot, and another was quite helpless, and died at the age of fourteen months.

CASE XX.—T. R., male, born at Thetford, Norfolk, father and mother were first-cousins. Father died from a contraction of the bowel; sound in mind, and steady; his mother used to stammer ; mother very nervous ; she was frightened during her pregnancy by seeing an idiotic man. Labour lasted twenty-eight hours, and she was delivered with instruments. T. R. is the first-born, and had three brothers and one sister ; one brother died from hooping-cough ; the second and third were twins, and are very healthy ; all sound in mind.

My own statistics differ so much from those published by Dr. Howe, of the United States, and on which many arguments have been based, that I am induced to place them in contrast :—

Dr. Howe's 17 marriages produced 95 children—*i.e.*, 5·58 each. Of the 95 children—

> 37 were of tolerable health.
>
> 1 was a dwarf.
>
> 1 was deaf.
>
> 12 were scrofulous or puny.
>
> 44 were idiots.
>
> ———

Total . 95

Thus more than 46 per cent. were idiots.

The 20 marriages, relating to my own cases, produced 138 children,—*i.e.*, 6·9 each. Of the 138 children—

> 75 had average health and intellect.
>
> 11 were consumptive.
>
> 8 were still-born.
>
> 4 died from convulsions or fits.
>
> 2 were hydrocephalic.
>
> 7 died young from infantile complaints.
>
> 6 were puny and delicate.
>
> 25 were idiots.
>
> ———

Total . 138

It will be seen that only a little more than 18 per cent. were idiots.

It will be interesting to place also in contrast the results of 20 marriages, in which there was no consanguinity, but in which there were one or more instances of mental defect in the progeny of each family, and which have been taken, like the former 20 cases, from a much larger number, without any principle of selection. The 20 non-consanguineous marriages produced 145 children, or 7·25 each. Of the 145 children—

> 83 had average health.
>
> 1 was consumptive.
>
> 11 were still-born.
>
> 3 died from convulsions or fits.
>
> 2 were hydrocephalic.

13 died from infantile complaints.

 6 were puny or dwarfed.

26 were idiots.

Total . 145

It will be seen that 18 per cent. were idiots. In the case of the consanguineous progeny, 55 per cent. were of average health; in the non-consanguineous, 57 per cent. No one, I think, who has had an opportunity of investigating the subject, or who compares these statistics with Dr. Howe's, can avoid coming to the conclusion that Dr. Howe's 17 cases were not typical of what is to be met with in this country. Only 39 per cent. of the progeny in his cases had average health.

I have shown that about 6 per cent. of those suffering from congenital mental defect, are the product of consanguineous marriages, while, among the healthy and vigorous, only about half per cent. may be placed as the result of such unions. One cannot, therefore, resist the conviction that the union of blood-relations has some influence in the deterioration of our species. What that influence is, however, can only be determined by a further investigation into the etiology of the 20 cases I have cited.

Out of the 20 cases, among whom the average number of children were 6·9 each, no less than 5 or 25 per cent. were primiparæ. This of itself, according to my observation, is sometimes a cause of idiocy. It may be explained, I believe, by the greater injury sustained in the birth than at subsequent labours, and is analogous to the determining cause of the preponderance of male over female idiots before alluded to.* No less important is the fact, that in two cases the forceps were employed at the birth of the child, or in 10 per cent. of the cases. I find from the statistical report of the maternity department of the London Hospital, by Mr. Heckford, published in the first volume of the *London Hospital Reports*, that the forceps were employed only in 8 per cent. of the children alive. It would not be difficult to prove, by reference to all the notes I possess, that in-

* In the statistics of the maternity department of the London Hospital (*London Hospital Reports*, Vol. i., p. 254), it is stated that the stillborn males exceeded the females by 35 per cent.

strumental interference is of itself, a cause of idiocy.   In two of the 20 cases, in which instruments were not employed, the head of the child was much misshapen by the difficulty of the labour.

One was a twin-child, and there is reason to believe that this condition may, of itself, be conducive to defective mental development. Suspended animation was reported in two cases or 10 per cent.; how far this may influence the future development of the child, I shall inquire into, in a future paper.

Ergot of rye was given in one case; but I am not aware of any observations on the use of this drug as a cause of idiocy.

This disposes of all the possible causes influencing the child at parturition.   I have now to inquire into the hereditary influences which might have affected the ovum, and I think it will be readily granted that no breeder of cattle, apart from all question of breeding in and in, would select analogous stock for propagation from, to those which constitute the parents of the twenty cases I have quoted.

Thus, among the progenitors of the twenty, in no fewer than twelve instances was phthisis, abundantly established in the family history of one or both parents.

In twelve cases there was well-established history of insanity, epilepsy, or imbecility in the family of one or both progenitors, reaching to the large amount of sixty per cent.   In two cases the fathers were habitual drunkards.   In one instance the mother was very deaf, and the same case furnished the solitary example of cancer.

There were only four cases in which there did not exist either a history of insanity or phthisis in the family.   In the first of these the father's mother stammered when young, the mother stated that she was nervous during her pregnancy, during which she was frightened by an idiotic man.   The boy had four brothers and sisters, all of whom were healthy, and he was one of the cases delivered by forceps.   In the second case there was no history of hereditary taint. There was, however, disparity in the ages of the parents, father was 41 and the mother 29.   The labour was very lingering, and it was the one case in which ergot of rye was administered.*

* Dr. Ramsbotham has shown that the ergot of rye influences unfavourably the viability of the child.

In the third case, the father was suffering from Bright's-disease at the time of procreation, from which disease he died.

The fourth case is the only one in which the consanguinity stands as an isolated cause, and even in this instance there are three sisters perfectly sound, and it is the only example of degeneracy in the family, while the mother asserts that she was frightened by seeing her mother with paralysis at the age of 73. It is worthy of remark that the father's mother also died from paralysis at the age of 70. The boy is a microcephale and the last born, the father, about the time of the procreation, grew thriftless, ran away to Australia, and has not been heard of.

It is also noteworthy that these four exceptional examples are all males. Reviewing the whole of these cases, there is only one, and that the one just mentioned, in which there is not quite sufficient to account for the idiocy apart from consanguineous influences.

Since writing the foregoing, my attention has been called to a paper of Dr. Mitchell's, read before the Medico-Chirurgical Society of Edinburgh,* in which, making observations from a similar point of view to myself, on a different field, he has arrived at very opposite conclusions. He found in Scotland that more than every sixth idiot born in wedlock was the child of cousins. I am unable to account for such a wide disparity, and in the face of it, can only re-iterate the care with which my information has been collected and the impartiality with which my results are here presented. My own researches conclusively show that in England, at least, every fourteenth idiot only is the child of cousins. But can it be as certainly shown that the relationship *per se* is the cause of the idiocy? I think not, and the analysis I have made clearly shows, that in the vast majority of such, so great in fact that it may almost be said to be universal, other causes were operating which were merely intensified by the relationship. Had the same care been exercised in the selection of relations, as is displayed by the breeder of race-horses, vastly different results might have ensued; or were the practice of the coloured races of North America in force, of destroying all the weak, rachitic, and diseased children, the inter-marriage of cousins would not have displayed the facts which I have furnished. Consanguinity has doubtless the power of aggra-

* *Edin. Med. Jour.* Vol. viii., p. 872.

vating any morbid tendency, as I believe it has, of perfecting any good quality. Any statistics on the results of the marriage of relations are of doubtful value, unless they give the life-history of the progenitors. What a different aspect the whole matter assumes when this plan is adopted, will be apparent to the readers of this paper. Whenever a similar investigation is made, I believe it will be found, as in the subjects of my own inquiry, that consanguinity is only *one* of the factors, and not the most important one, in the production of deterioration.

If our advice be sought, it will be our duty to inquire into other elements which are less on the surface, but which have equal or even greater potentiality for evil.

Alliances, such as I have exhibited, with hereditary disease on both sides, should be discountenanced even where there is no element of consanguinity. It would only be a part of a true philosophy to render more forcible our opposition where blood-relationship would have a well-determined tendency to aggravate the wrong.

CASES OF CEREBRAL HÆMORRHAGE.

By J. HUGHLINGS JACKSON, M.D.

GENTLEMEN,—I show you to-day a patient whose case is a good illustration of a common condition of ill-health, a condition which leads to, or is associated with, many named diseases. The disease, or rather the symptom, for which the patient came to me, was Hemiplegia.

The paralysis came on suddenly, and was beyond doubt due to Apoplexy. But the use of the word apoplexy in the sense of effusion of blood is liable to lead us wrong.   *   *   *   *

I shall, therefore, in future, use the term Cerebral Hæmorrhage. I have little doubt that the effusion occurred in the thalamus opticus. I do not now, however, speak of the physiological symptoms of the patient's case, but of that general condition of his system which led to the giving way of a blood-vessel in his brain.   In previous lectures I have discussed the question of the position of the disease as regards particular forms of hemiplegia ("Lectures on Hemiplegia, Vol II.).

Those lectures were on the physiology—the Medical Physiology—

* This is not a lecture on the general subject of Cerebral Hæmorrhage, but on particular instances of Cerebral Hæmorrhage. Yet, in considering a few cases, I have spoken widely on collateral topics, as I wish to describe single cases as illustrating general pathology, rather than to point out how, and where, the nervous system is most often damaged by effusions of blood. Moreover, I have not hesitated before printing to alter, or add to, what I orally delivered, although this involves a little anachronism in the introduction of more cases for illustration.

of Hemiplegia.   Clots are most often found where the brain is most
vascular.   Therefore, they generally involve the corpus striatum,
and thus cerebral hemorrhage often produces paralysis.   But it is
scarcely precise to call hemiplegia a *symptom* of cerebral hæmorrhage.
The pathology would be the same if the clot were in the hemisphere,
in the pons, or in the cerebellum, although the physiology would be
different.   So then, although the amount of blood effused, and the
seat of rupture are all-important to the patient, yet in the line of
thought we are now taking up, a point of more importance is—how
comes he to have effusion of blood in his nervous-tissue at all ?

First of all I beg you to observe that the degree and persistence
of paralysis, in a case of hemiplegia, cannot safely be taken as an
index of our patient's chances of life.   For the amount of paralysis
depends (1) on the position, and (2) on the size of the clot.   If it
were in the mass of the hemisphere, above the ventricle, there need
be no paralysis at all.   There might be general weakness, but no
localized paralysis.*   If the motor tract were injured—as the corpus
striatum, thalmus opticus, crus cerebri, &c.—there would certainly
be some paralysis, however small the clot, at all events at first, and
the degree and permanence of the palsy would depend on the size of
the clot thus placed.   It might vary from a little weakness of the
limbs, of which the patient only might be aware, to complete loss of
power in them.   When the damage to the motor tract—at least to
the corpus striatum—is very small, the paralysis may pass off alto-
gether, even when the whole of the damage is not repaired.†

* It is, in my experience, however, rare to find clots, or cells of clots,
larger than a pea, at a great distance from the motor tract.   It is impor-
tant to bear this in mind when we are trying to fix the seats of certain
faculties.   Some parts of the brain, for instance the posterior lobes, are
rarely the seats of hæmorrhagic effusions, whilst others, as the region of the
corpus striatum, are often damaged by clots.

The vascularity of the region of the corpus striatum is, I think, a fact of
great significance in the study of the relations of nutritive life and func-
tional activity.   On this point I have already written.—" Physiology and
Pathology of Language," *Med. Times and Gazette*, June 23, 1866.

† It will be observed that disease of the corpus striatum produces partial
paralysis of the arm, and not paralysis of part of the arm.   The whole of the
arm is, I believe, represented in every part of the corpus striatum, and so,
if the damage to this organ be great, there is complete paralysis of the limb,
and if slight, the whole of it is weakened.   I do not say that every part of
the arm suffers exactly the same.   It would be difficult to prove this,

The better a patient's general health is the more likely, of course, is he to get over the effects of the injury to the brain which caused his paralysis. And when the damage is too extensive to be repaired, and when he in consequence continues paralyzed, there is more hope that he may pass a long time, perhaps years, without any further damage to his nervous system. Although I hold, as I urged in a former lecture,* that we should in every case try to find the Function Disordered (here the paralysis, &c.), the Organ Damaged (here the thalamus opticus), and the Tissue Affected (effusion of blood from rupture of a vessel), the last is most important. Indeed, I think it would be far better to ignore the paralysis altogether, than to omit to consider the condition of the urine, arteries, heart, &c. The paralysis (the disorder of function) in our patient shows that the motor and sensory tract, and perhaps the adjoining hemisphere, are (the organs or parts) *damaged*, but an examination of him generally shows that his tissues are nearly everywhere diseased. So, in making a *post-mortem* examination on a case of cerebral hæmorrhage, it is almost as bad to omit to examine the kidneys as it would be not to examine the brain. We are often consulted for more or less sudden disorder of function, consequent on damage of organs; rarely for

as some groups of muscles are stronger than others. When then one small part of the corpus striatum is damaged, the rest may be cultivated so as to make up for the want of the part damaged. This is important as regards the views we should hold as to what we call "centres." The centre for the arm is, I hold, the whole nervous system of the arm (from the corpus striatum to the termination of nerves in muscles, and their origin in skin and other parts) and I think we may find by a consideration of the whole of its nervous system, a gradual ascent from grouping of muscles for simple movements like flexion or extension, to completer and more complex actions In doing this we must consider Hilton's law of the distribution of nerves to skin, muscle, &c., and Brown-Séquard's researches on the arrangement of fibres in the spinal cord. In such a view of the matter the brachial plexus is a centre as well as is a collection of grey matter. Its complexity must mean something, and no doubt this arrangement of fibres is a help, probably by induction, to combine movements. Quadrupedal-walking, I think, shows that the crossing of the motor and sensory fibres in the cord has a similar duty. Of course much of this must be speculative, as no one knows the effects of section of any one of the various cords which enter the brachial flexus; but this is a kind of knowledge which it is most desirable to obtain, and to encourage the search for it I put these speculations on record.

* See "Lecture on the Study of Diseases of the Nervous System," Vol. i., p. 146.

disease of tissues, so long as they will hold together. I think our patient is in a very bad condition, not from his Physiology, but from his Pathology, if I may use these terms thus. He has already had several effusions of blood, and is very liable to more attacks of the same kind. Besides this, we know from experience that such a patient is ready to give way at almost any point, and it is very doubtful, to say the least, under which heading, in the Registrar-General's list, the final medical record of his case will be made.

I repeat that you may get very far wrong if you conclude that, because a patient recovers quickly, he is necessarily in a better condition than one who remains paralyzed. Of course he is to be congratulated that he has got rid of his paralysis, or of any other trouble ; but you certainly ought not, I think, to tell him that he is well when the symptom, he consulted you for, has disappeared. We should know no more than our patient if we judged merely by the superficial event of recovery from a symptom. It would be to endorse an idea, the public not unnaturally have, that their diseases are accidents, and are to be cured by some specific.

There is, doubtless, an accidental element in the bringing about of hemiplegia. And sometimes it seems to be altogether an accident, though, perhaps, in the strictest sense, no event is accidental. A person may be in robust health when the function of his corpus striatum is quite lost, excepting, of course, for the paralysis of his limbs due to the loss of that function. This is so when this part of the brain is softened from plugging of the artery—the middle cerebral—the branches of which supply it with blood. I have, now under my care in the out-patients' room, a woman, 21 years of age, who had an attack of hemiplegia of the left side (by-the-way, without affection of speech) one week before her confinement. Under the care of my colleague, Dr. Fraser, she got nearly rid of her paralysis ; but when it was most marked, there was nothing whatever about her condition to indicate general ill-health, and the physiological disturbance of child-bearing had not affected her much. Of course, I cannot demonstrate it, but I have little doubt that embolism of the right middle cerebral artery was the cause of the hemiplegia in this instance. If so, the hemiplegia was as nearly an accident as it could well be.*

* This patient has recently had a " partial fit " affecting the limbs

When, however, hemiplegia occurs from hæmorrhage into the corpus striatum, we have quite different conditions—the hemiplegia here is really a different disease. In a previous lecture (Vol. i., p. 136), I insisted on this point, and gave four instances of hemiplegia, each of the same physiological kind, but depending on a different pathological condition; and in that lecture I begged of you not to mistake Medical Physiology for a complete knowledge of your patient's case. Besides, not only are the damages to the corpus striatum different, but that they occur in a different kinds of people. In cerebral hæmorrhage the vessel breaks in the corpus striatum; but, as I have said, patients liable to it are often ready to give way at many points on slight provocation. The organ is more seriously damaged, and the organ damaged has very bad associates. Indeed, so generally unsound is the patient, the text of this lecture, that whilst I give his case to you as an instance of the kind of constitution which patients with cerebral hæmorrhage have, I must tell you that it is an exaggeration in degree of what is common.

The patient I shall show you, at the close of this lecture, has, no doubt, for years been getting into a condition in which the vessels of his brain would readily give way. Frequently, however, our patients know nothing, or they think little, of the serious changes which render them liable to such accidents. Their tissues become so universally, and yet so slowly, lower in vitality, that there are no particular failures to obtrude themselves until something gives way, or until some part becomes inflamed. And when a patient comes to us for "winter cough," I fancy even we may think too much of his temporary bronchitis, as he is sure to do, and too little of his permanent emphysema. If he consult us for pneumonia or pleuritis, we must not think we have got to the bottom of the matter by saying he has taken cold. A patient's pleura is not a thing apart from him, but a piece of his body; and when we hear a friction murmur, we must not treat *it*—if I may say anything so grotesque—but the inflamed pleura, and the man of whom it is a part. It, doubtless, simplifies matters, in a superficial sense of the word simple, to know

which have nearly recovered from the paralysis, and I think, as I have already suggested (Vol. i., p. 431, 444, 467), that after partial or apparently complete recovery from the paralysis due to blocking of the middle cerebral artery or some of its branches, sometimes the patient is liable to unilateral epileptiform seizures affecting the side previously paralyzed.

that there is lymph effused, and to think of mercury, and to try to get the lymph taken up. Just so, it is very loose talk, talking of treating hemiplegia, for hemiplegia is not a constant quantity.   Yet, the man who thinks of hemiplegia as an entity, and gives what he has found " good for hemiplegia," will have a certain kind of satisfaction.   But it makes one less confident in the treatment of diseases of the nervous system to define severely when we can, the internal changes on which the outward symptoms depend.   When we can, as it were, *see* a great brutal clot, or a large, irregular, yellow-stained cavity, in the motor tract, we are less hopeful.

The following case illustrates the false confidence I have spoken of, and also what I have been saying about recovery from paralysis, being no safe sign that the patient is likely to continue in health. This patient died, and I am able to give you particulars of the autopsy we made.   After reciting his history, I shall return to the case, the chief text of this lecture.

Early in 1865, in Harrison's ward, there were two* patients, who were hemiplegic, and each had albuminous urine.   One, aged 47, did not improve at all ; the other (W. K.), aged 40, recovered quickly.   The first patient had degenerated arteries as well as renal disease; but although he was thus evidently in a bad enough condition, I thought the other (W. K.) was in a much worse one.   The latter had extensive retinal degeneration, such as we know to be characteristic of chronic Bright's-disease, which the former had not. The existence of marked retinal degeneration, leads me to think very unfavourably of cases in which it is present, however little the symptom, for which the patient consults me, may incapacitate him. The following is a very instructive history to those who wish to think a little beyond single striking symptoms : —

W. K., 40 years of age, a brewer's servant, was transferred to my care by my senior colleague, Dr. Parker.   He was admitted February 20th, 1865, having been attacked three hours before with apoplexy, which produced complete hemiplegia of the left side.   He was,

* I have spoken of these two cases, and also of that of a third patient, in the ward at the same time, in a paper in the *Royal London Ophthalmic Hospital Reports*, Vol. iv., Part 4.

I have not hesitated to break the narrative whenever I have thought a symptom required a larger illustration than one case could give it.

when admitted, only partly sensible; and when he came to himself, he talked badly, as many hemiplegics do at first, whether they be affected on the right side or on the left.   Next day, however, he was intelligible ; and when I first saw him, a few days later, he talked quite well.   He had the common form of hemiplegia, in which we find, after death, disease, either of the corpus striatum, or of the thalamus opticus, or of both.   On the diagnosis of the *position* of disease, I wish to say little now ; and I particularly beg you to observe, that the following investigations ought to have been made, if the effusion of blood had been in the retina only, or if the case had been so simple a thing as epistaxis.

W. K. had, he said, been " amongst beer all his life."   Yet, for a brewer's servant, he had been temperate.   He had drunk only five pints of beer a-day, and "a chance drop of spirits now and then." It may seem odd to call this great excess "temperance;" but I speak comparatively.   I have now, under my care for epilepsy, a young man, also a brewer's servant, who says he has been in the habit of drinking twelve pints of beer daily.   A gallon a day is not a very uncommon allowance.   He got his beer for nothing, and it rarely occurs to patients in this rank of life, or in one a little higher, that now and then fluids, which cost much, had better be poured down a drain than down their own throats.   It must be admitted that some of our patients bear this continued excess for a very long time without being incapacitated by disease.   I have now under my care, a man 55 years of age, who has had, as I pointed out to you in a former lecture, hemiplegia from hæmorrhage into the left side of the pons Varolii.   This patient tells me that he has not once gone to bed sober for twenty years.   For all this he has no albumen in his urine, although I have very often looked for it.   His arteries are only very slightly moveable, and he seems generally vigorous. Moreover, he rapidly recovered from the attack of paralysis.   (See *London Hospital Reports,* Vol. ii., p. 323.)

Do not, however, misunderstand me to mean that drink is the sole cause of degeneration of tissue.   We meet with granular kidney, with retinal disease, and with cerebral hæmorrhage, now and then, in young and temperate women.

Recently I had, under my care, in Charlotte ward, a woman only 19 years of age, who died of cerebral hæmorrhage.   She had ex-

treme granular disease of the kidney; and during life we saw that
the retinæ were degenerated, and there were patches of blood
scattered in various parts of them. We saw these little clots again
after death. Mr. Frederick Mackenzie removed the posterior halves
of the globes without interfering with the fronts of the eyes, and,
therefore, without disfiguring the patient. The cerebral arteries
were much diseased, and there was a large clot in the left hemisphere.

W. K. was a stout, flabby, greasy-looking man. His arteries
were large and prominent, and were easily seen to move, and felt large
and tough to the finger. When he flexed the elbow-joint, we saw
that the brachial artery did not accommodate itself to the new position,
but arranged itself in several large curves. The apex of the heart
was felt to beat on a line with the nipple, and there was a general
heaving over the ventricle. At the apex was heard a slight systolic
murmur. There was no evidence of aortic regurgitation to account
for the mobility of the arteries. There was very trifling œdema of
the feet, but a year before he had had swelling of the legs, and he
was then away from work five weeks.

It is a mistake to think that the complete absence of dropsy
nègatives kidney disease. You must not use the expression, "there
is no evidence of kidney disease" when you have not examined the
urine. Indeed, you will observe that patients the subjects of retinal
or cerebral hemorrhage, rarely have dropsy beyond a little œdema of
the feet or back, but I have scarcely ever made a *post-mortem*
examination of the body of a patient who had died after cerebral
hæmorrhage without finding decided evidence of granular disease of
the kidney. In a former lecture (Vol. ii., p. 314), I told you
that I had never made an autopsy on a case of cerebral hæmorrhage
without finding disease of the kidney, but I have recently seen two
cases in which I could not say there was anything wrong with this
viscus. One of these patients, whose brain Mr. Llewellyn brought to
me, however, had instead, if I may say so, cirrhosis of the liver.
Of course I exclude cases of hæmorrhage from rupture of aneurisms
of the cerebral blood-vessels, in which cases there is no reason to
expect an association with disease of the kidney.

Neither must you conclude, that because a patient's urine contains
no albumen at one or two examinations, that his kidneys are healthy.
Relieve your minds by stating the facts, that the urine contains no

albumen and no casts, and not by the inference that there is no disease of the kidneys.

A few weeks ago, we had in the Hospital, under Dr. Fraser's care, a middle-aged patient who died, after a succession of severe convulsions. Mr. George Mackenzie tells me that there was no albumen in the urine during life, but the patient's kidneys were found, at the autopsy, to be very much diseased ; the brain appeared to be healthy. Probably the man died of disease of the kidney, although there was no albumen found in his urine after a few examinations.*

To resume W. K's. case. I dilated his pupils with atropine, and several of us examined his eyes with the ophthalmoscope. We found in each eye changes which are characteristic of Bright's-disease. The optic discs were nearly lost in a general reddish-white haze, and the veins, seemed here and there, to be partly buried in it. In some parts of the fundus, especially about the yellow spots, there were white patches of various sizes like droppings of melted tallow.

The ophthalmoscope was used here for the sake of observing tissue changes, and not in order to learn if the eye, as an apparatus, was normal (See Lecture on the Study of Disease of the Nervous System, Vol. i., p. 147). Indeed the man said that he had always had good eyes, and seemed to wonder why I examined them. He could, however, only read large newspaper print, although, if he had had convex glasses, he would probably have read smaller type. An ophthalmologist would tell you that test types ought to be used, and that degrees of myopia and presbyopia ought to be estimated carefully. I agree with this, and whilst excusing myself on the ground of want of time, I regret that I did not investigate the state of this patient's sight more precisely. I generally carry with me a few convex and concave glasses, in order to tell readily whether a patient's imperfect vision be due merely to presbyopia or to myopia. Many people of this patient's age require convex glasses to see to read well. Of course the loss of accommodation which constitutes

---

* How he died from disease of the kidney, however, I do not know. All I know of serous apoplexy is that it seems to be a form of uræmia, but in this patient's brain there was no excess of serum. It is then almost gratuitous to say that he died from disease of the kidney, as I am quite sure patients die in a similar way who have healthy kidneys, and whose brains appear to be normal.

presbyopia is due to slight degenerative changes, and therefore means something, but it does not mean much.

I wish here to impress on you, that we are not justified in saying there is nothing wrong with our patient's eyes, when he tells us that he can see well. This applies especially to Optic Neuritis. Slow changes are probably overlooked by the patient until they actually incapacitate. At all events, you will not unfrequently find very striking abnormal changes in the fundus when the patient can read very small print. I beg of you to use the ophthalmoscope, in cases of cerebral disease, at all events, in all acute cases. I am quite sure that you will sometimes form an imperfect idea of your patient's case, unless you do. Of course record that the patient can see to read small print, but also record the abnormal appearances in his visual apparatus.

W. K. not only thought his sight was good, but he thought his general health had been good too. He insisted that he had always been well, except for the short illness of the previous year, and he had kept at his work. Indeed, he had felt quite well, until one unlucky morning when, on entering a stable, he found that one foot lagged, and soon after he became insensible. The arteries of his brain, however, had, no doubt, been for a long time slowly getting less elastic and more brittle. Yet his bad tissues answered indifferently well in general, until one part, perhaps worse than another, suddenly gave way, and then this universally unsound man was brought to us for an actual disease.

It is wonderful how long bad materials will sometimes keep together. It may be, that although the patients are unsound, their general unsoundness is conservative. There is no healthy organ left to overwork the unhealthy ones. These patients descend into a lower sphere of vitality altogether—one which will do for routine work, for fair weather and for easy circumstances. The healthy human body, as Mr. Paget says, is fitted for the storms as well as for the calm of life. But patients like W. K. have no spare vitality, and, as I have said, are ready to give way under unusually unfavourable circumstances. They are ready to die at any point. A man with chronic Bright's-disease may die of apoplexy, of bronchitis, of uræmia, of pericarditis, &c., &c., but to look on the pericarditis, apoplexy, &c., in such cases as idiopathic, as essentially different things, rather than

as different events, depending on one general condition, would be to think, as those historians seem to think, who write history from the reigns of kings, from battles and other striking events. It would be as reasonable to consider the outbreak of the French Revolution as idiopathic, as it would be to consider W. K.'s attack of cerebral hæmorrhage as idiopathic. Moreover, and this brings me back to his case, such a patient may be attacked with one of the above diseases, and when recovering may die of another. W. K. was congratulating himself on getting rid of his paralysis when, on April 13th, he took to his bed, became gradually more and more stupid, his skin became hot, he had occasional delirium but no convulsions, and in a few days he died.

At the *post-mortem* examination, kindly made for me in my absence, by Dr. Woodman and Mr. James Adams, a very large, dirty reddish clot was found in the right hemisphere. It occupied nearly the whole length of the hemisphere to the outside of the lateral ventricle, but had not broken into the ventricle. A good deal of serum was also found beneath the arachnoid, and "there was some purulent lymph on the layer of dura mater on the posterior part of the foramen magnum." The kidneys were granular; the left ventricle of the heart was hypertrophied, and there was atheroma on the valves. The lungs were emphysematous, and were congested, especially at their bases.

Whether this patient's death be attributable to arachnitis, due to the kidney disease, and whether indirectly to general cerebral disorder, being excited by the clot acting in the brain as a foreign body, I cannot tell. It is believed that there is no such thing as idiopathic arachnitis, but we occasionally meet with cases of arachnitis in which we can *discover* no local exciting cause, such as injury, diseased bone, &c. In a case of arachnitis, occurring with kidney disease, I have heard Dr. Barlow suggest that the arachnitis may have arisen, as we know pericarditis does, from or with disease of the kidney. Although this, of course, does not explain its occurrence, it puts the question on a particular basis for a possible explanation.

We now see that W. K's. recovery from his paralysis was a very small fact to the credit side of health. It did not even point to a small clot, but was owing to the fact, that a large one was placed outside the lateral ventricle.

I think, much less, paralysis is produced by damage to the extra-ventricular part of the corpus striatum, than by damage of the part which is in the lateral ventricle. Of course, I do not include cases in which the bodies in the floor of the ventricle are undermined, as they not unfrequently are. I will now relate another instance of rapid recovery from hemiplegia, due to hæmorrhage : a case in which the clot was a very small one.

A year ago, I had under my care a patient who was suffering from locomotor ataxy. He had an attack of hemiplegia, and then, by the courteous consent of Mr. Lammiman, I saw the patient at home. The paralysis was on the right side, and for about twenty-four hours speech was lost. Now, although in this patient the paralysis passed off even more quickly than in W. K.'s. case,—indeed, in two or three days,—I thought very unfavourably of the case, as the man had Bright's-disease, as well as the symptoms of locomotor ataxy. At the *post-mortem* examination, some weeks later, we found the remains of several small clots in his brain, one the size of a pea (and this no doubt caused the paralysis), involving the ventricular part of the left corpus striatum, where it becomes narrow, and the hemisphere near it. One pleural cavity contained a good deal of fluid. The kidneys were granular, and the left ventricle of the heart was much hyper-trophied. I shewed you all these parts in a former lecture. The paralysis was so transitory, in this case, that the hemiplegia might have been considered, during life, to have been due to those very slight changes which we call functional. The rapidity of recovery was doubtless due to the fact that the clot was a very small one, and that it involved very little of the motor tract.

This case, and that of W. K., shew that we might get far wrong if we were trying to find out what would " cure " hemiplegia—if we thought the drug we gave a patient had cured him, simply because the paralysis passed off after he had taken it. Such an inquiry would be a very hopeless one. It might be intelligible conduct to try to find out what drugs would cure cerebral hæmorrhage ; it would be, at all events, getting nearer to a thing to be done. In neither of these cases was any drug treatment relied on. And, indeed, I know of no rational plan of curing cerebral hæmorrhage except so far as treating the patient goes. Upon the whole, the best thing you can do, in cases of slight cerebral hæmmorhage, is to keep the patient

quiet, remembering that he has got an injured brain, and that it chiefly requires rest. There is empirical evidence to shew that purgation does good, but we must not add an artificial diarrhœa to the troubles of the system, without a full consideration of what the system can bear. I am not speaking of those severe cases generally called Apoplexy. As to curing, we may " cure paralysis " in which there are small clots near the corpus striatum by charms, or globules, but if the motor tract be largely ploughed up, we shall do very little to restore the patient's power.

Let us then, turn to what we can do, or rather let us look in the direction in which something may be hopefully expected. Towards this end, besides considering what local damage has been inflicted, let us see what more is likely to happen to the patient when the effects of that local damage have disappeared or diminished as much as they are likely to do. As we cannot treat the local disease with much satisfaction, we must do what we can for the general health. We examine all the important organs, study the conditions of the tissues by examination and inference. But the General Health of many of our patients, as you will have gathered, is not unfrequently General Disease, and unfortunately it often remains so after the eager use of our feeble remedies. The more we know of pathology, the less we can believe in treatment. Had I lived a thousand years ago, I might have cured a case like that of Mr. Lammiman's patient, by charms; a hundred years ago by some rare drug, but I am glad I live to-day when it is known that such patients recover when let alone.

If the hæmorrhage had been into the retina only, in the case of W. K., the prognosis would also have been very unfavourable. I do not say quite as unfavourable; for we must bear in mind that after an attack of cerebral hæmorrhage, especially when the effusion has been considerable, the patient has a foreign body in his brain, and this may " excite " general changes—a sort of cerebral fever. The thermometer ought to be used in such cases. I say general changes, but I have not a very clear idea what they are. Hence it is very important to keep a patient quiet who has a clot lying in his nervous tissues. Again, if the clot breaks into the ventricle the seizure is, I believe, nearly always fatal. However, commonly, hæmorrhages in nervous tissue have, independently of the importance of the symptoms due to their size and positions, one general bad significance. The following case is another illustration :—

Last winter a patient, sent to me by Mr. F. M. Corner, came to the out-patients' room, for slight defect of sight and giddiness. The former was due to effusion of blood, for we saw it in the retina, and very possibly the giddiness was due to small clots in the hemisphere, of which, of course, we had no means of being quite certain. It may have been due to bad blood from failing work of the kidney. As, besides the effusion of blood, we found the degeneration of the retina of which I have spoken, albumen in the urine, and rigidity of the arteries, we thought very ill of our patient's case, notwithstanding the comparative slightness of his physiological symptoms. A few weeks later this patient died under Mr. Corner's care, of pericarditis. The following case is more striking still :—

Some years ago I saw, when clinical assistant at Moorfields, a patient under the care of Mr. Wordsworth, who had, first, effusion of blood in each retina and considerable defect of sight, and next, hemiplegia. He, however, recovered his sight to so great an extent, that he thought he saw as well as ever he did, and he got into what he considered to be perfect health. Yet I found that his urine contained albumen when he left the Hospital, and about nine months from the first attack of hæmorrhage (that is the retinal),* I heard that he died of, it was believed, cerebral hemorrhage.

If a patient of middle age were to consult you for a slight epistaxis, you ought, I think, to examine his urine, and if it were albuminous, if his arteries were rigid, and, above all, if his retinæ shewed signs of degeneration, you would have to think seriously of his case, however careless he might be of so apparently trivial a thing as the loss of blood by the nose.

Epistaxis, giddiness, and all such symptoms, are not so interesting as loss of speech, but their significance is very great, and ought always to lead us take stock of our patient's state of health. I fear there is a risk that you may let your minds dwell too much on symptoms of great physiological interest and under-rate the general condition of the patient. Again, some cases have a sort of dramatic interest which gives them undue importance. If a clergyman begins to talk badly all at once in the pulpit, the alarm is greater, but in reality the epis-

---

* I would here refer the reader to the *Medical Times and Gazette*, Nov. 18th, 1865, for cases and remarks by Hulke, Ernest Hart, Hutchinson, Fuller and Gull on retinal disease with disease of kidney.

taxis in my patients' case was, I think, quite as significant. The former would be more important, as the nervous system would be damaged in a more important part; but, when it had passed off, it need frighten us no more, and no less than epistaxis would do if the patient were generally unsound. I hope I need scarcely tell you, that I hold as strongly as any of you, that the position of disease should be ascertained wherever it can be, but I think it a very gross mistake to direct most of our efforts to finding where the disease is, instead of trying to ascertain how it happened, and what is likely to become of the patient who has it. So then, whether the symptoms be aristocratic or plebeian, you must think from them, as evidence of your patient's general conditions, and not on them as individual diseases.

Sometimes epistaxis precedes retinal apoplexy as it does the more serious apoplexy of the brain. I have now under my care in the out-patients' room, a patient whose case illustrates this relation.

A man, 49 years of age, had two years ago bleeding from the nose to the extent of "a basinful and a-half." Five months before I saw him he had hemiplegia of the right side and loss of speech. He came to me for the two latter symptoms having, however, nearly recovered from them. He had then, and since, albuminous urine, and subsequently hæmorrhage in the retina of the left eye. For the defect of sight he afterwards consulted Mr. Hulke, but soon returned for a slight attack of hemiplegia of the left side, which is rapidly passing off.

This man's case is a very interesting instance of a succession of similiar pathological changes producing very dissimilar results. Unfortunately it is not very probable that I shall get to know what becomes of this out-patient. I fear it is scarcely likely that he will live long, and it is very doubtful of what diseased organ he will die.

Slight effusions of blood in the eye are more frequent than is supposed. In some positions they affect the sight so little, that the patient may not consult an ophthalmologist, and the physician may not use the ophthalmoscope. When a patient complains of the slightest dimness, the eye should be examined by the ophthalmoscope, or we shall lose facts of great significance. A woman, who was attending at the Hospital for epilepsy and paralysis for unilateral epileptiform seizures, complained that one day there came a dimness

over her eye like a " corkscrew." I found a small clot on the optic disc. Her urine contained albumen.

It is not very long since I should have put down such defects of sight in cases of disease of the nervous system to central damage, and I might, perhaps, have relieved my mind by some formula, such as " congestion," " thickening of membranes," " effusion of serum," " disordered circulation," or " irritation." Much of our progress, if I may use an Irishism, is going back, and the great advantage of the ophthalmoscope is, that it has driven away many of the presuming technicalities which pretended to settle large questions, and yet which contained very little real truth. We can come closer to things. The ophthalmoscope has stripped our ignorance of some eye-diseases nearly naked, and we rarely now hear people talk of "curing" amaurosis. I do not deny the temporary value of such terms. For, whilst they give body and form to masses of error, we feel that they contain a certain amount of truth which we cannot define, and which we cannot afford to lose. We all of us use many such words—*e.g.*, Hysteria,—and but little harm will happen from their use, if we remember that they are definitions of our ignorance, as well as statements containing something that we know. If we destroyed all words of which this might be said, we should, I fear, destroy language altogether, and render thought itself impossible.

Retinal apoplexy does not, however, always, I think, indicate wide degenerative changes, although, I believe, it generally does. There is now in the Hospital, under the care of Dr. Davies, a woman who had, as Mr. F. Mackenzie pointed out to me, a small hæmorrhage near a vessel in the apparent lower half of the left fundus. It did not impair her sight much, and it soon disappeared. She had dropsy from heart-disease; but no evidence of kidney-disease. The patient, whom I shall show you at the close of this lecture, and of whom I spoke at the beginning, has had epistaxis. I now relate his case :—

This patient also came under my care, November 17th, 1865, having been admitted by Dr. Parker, who was good enough to transfer him to me. He is 53 years of age; he has had, I think, several effusions of blood.

For a fortnight before Easter Monday, 1865, he had every night attacks of vomiting. He had violent retchings, but he brought up

nothing yellow or green. It was not the bilious vomiting of what we hear so much in cases of brain-disease, although it had, doubtless, the same meaning. It may be said that, as this patient has renal disease, the vomiting was due to the more general effect of poisoned blood, rather than to a local lesion of the brain. It is not possible to be quite sure; but I think it was just as likely that the vomiting was a symptom caused by injury to a part of the hemisphere by a clot. One thing is quite certain, that disease of the hemisphere does produce symptoms such as this patient had, and I shewed you a good instance the other day in a case of cancer, affecting the middle lobe of the cerebrum, in a patient who had had optic neuritis and severe vomiting.

The attack* was not enough to keep my patient from work, but he was not fit for much, and he suffered from headache.

I have often told you that there are three symptoms, which very frequently come together, optic neuritis, vomiting, and severe headache. As a rule, these symptoms are produced by tumours, but now and then they come from effusion of blood. Sometimes they occur directly after the hæmorrhage, and not unfrequently after awhile, perhaps when the patient thinks he is well from the secondary effects. This, however, is too wide a subject for this lecture. I merely say, in passing, do not hastily conclude that vomiting is due to something wrong with the stomach, or that nervous symptoms with stomach symptoms, are due to derangement of the digestive organs, nor, if you find albuminous urine, to kidney-disease. Vomiting is a symptom which very often attends general disturbance of the brain, whether that be a shock from sudden pouring out of blood, or the changes (encephalitis) which are "excited" about "foreign bodies." And these foreign bodies may be hæmorrhages, as well as tumours. Amaurosis (optic neuritis) is often part of these changes. When the changes are slower, or when the acuteness is over, epileptiform seizures may follow. These facts show how wide the relations are which the symptom vomiting has. Again, when vomiting occurs with

---

* As will be seen by the antopsy, I was probably wrong in this opinion, but I am not wrong in saying that hæmorrhage into the hemisphere may produce little more than what for brevity I may call stomach symptoms. A case recorded by Mr. Gregory Forbes, *Path. Soc.* Vol. xiii., p. 7, shews this.

apoplexy do not take it as certain evidence that the clot affects the medulla oblongata, or the cerebellum.

The second hæmorrhage occurred during the first fortnight. Although this was only epistaxis, it is, as I have already urged, a symptom to be carefully noted. We must not, however, forget that it is held by many, that bleeding at the nose is salutary as relieving the circulation of the head. It may be so, and, indeed, I think there are reasons for believing that cerebral hæmorrhage may be, sometimes, due to rupture of veins, rather than of arteries. If so, bleeding at the nose might relieve the venous system generally. Still I think the general evil significance is pretty much the same, whether blood be effused in the retina, or in the nose, and in each of these cases it is not so much a question of the symptoms as of the state of the tissues of the patient who suffers.

The third effusion of blood produced the prominent symptom for which the patient consulted me, namely, the hemiplegia of the left side, which came on on Easter Monday, 1865. To the quasi-accidental circumstance, that this effusion was in the motor tract, I owe it that he became my patient. Had the first large effusion been in the retina, he would have gone to an Ophthalmic Hospital. Had it been at the nucleus of the ninth nerve, he might have gone to a Laryngoscopist. If bronchitis had been the most urgent symptom, he might have gone to Victoria Park. If the hæmorrhage had occurred in the labyrinth, to some Aural Surgeon. Finally, I introduce the Special Hospital with which I am connected. The patient had been under the care of one of my colleagues at the Hospital for Epilepsy and Paralysis. The geographical distribution of disease in London is a curious and interesting subject for study. It would, perhaps, be better if cases were distributed— if there is to be a division of labour—according to disease of tissues, rather than according to damage of organs. Yet, to suggest this is very likely to suggest one impracticability in the place of another.

The attack of hemiplegia came on suddenly, but the patient was not insensible. He said that in the morning, about eight o'clock, as he was preparing to go out with his family, he "began to heave," but did not actually vomit. His left knee gave way ; his left fingers felt stiff, and he fell down. He was at first completely paralyzed, and kept his bed fourteen days, and could not get out of bed by

himself for a month.   During this fortnight he had gout affecting the non-paralyzed hand, leg, and elbow.

I have very little doubt that this attack was owing to a clot.   It might be held that as there was no insensibility, the paralysis was due to the giving way of a few softened fibres ; yet the presence of chronic kidney-disease, in adults, would generally lead to the diagnosis of effusion of blood, when the brain symptoms are one-sided, and come on in the midst of usual health.   The more I see of the pathology of the brain, the less do I believe in limited softening as a cause of decided and continuing local paralysis.   In nearly all the cases of hemiplegia, I have examined *post-mortem*—putting on one side such obviously different causes as embolism, tumours, &c.—I have found clots or their remains.   Of course, I keep in mind the obvious fact that I do not get *post-mortem* examinations on those who get well and keep well.   In some cases where the paralysis has been transient, the clot has been a very small one, or has been near to, or has broken up little of the motor tract (see Case p. 248).   I introduce these remarks, as I know that some distinguished men, for whose opinions I have a very great and an increasing respect, ascribe transitory attacks of hemiplegia—I do not mean epileptic hemiplegia, nor ought I perhaps to say, in cases in which there is such evidence of degeneration as my patient presents—to those slight changes, which are called functional.   I hesitate myself to adopt such a conclusion, but I ask you to bear this view in mind as a possible explanation of transient hemiplegia when it occurs in patients whose tissues appear to be healthy, or rather not to be in a bad enough condition to justify us in diagnosing rupture of a blood-vessel.

I am myself confident that quick recovery is no certain evidence that there is not obvious, although of course limited, disease in the brain.   And you must clearly understand that cases of hemiplegia are met with, in which there is not sufficient evidence on which to come to a diagnosis of the cause of the damage which produces the paralysis.   There are many cases of disease of the nervous system in which, as a first step towards discovery, a definition of our ignorance is urgently required.   It is a sign of an uncultivated mind to determine to come to a conclusion whether there is precise evidence or not.   It is not possible sometimes to say whether hemiplegia is the result of softening from embolism, or of tearing from hæmorrhage.

Our patient had a fit in August. He had regained enough power in his arm and leg to go about, and was on a short railway journey when it happened.

Here let me mention that we must not think our hemiplegic patient is deceiving us as to the degree of his paralysis, because he can manage to get over a good deal of ground in a day. One of my patients, who was formerly, as most of you know, a servant at this Hospital until he was disabled by an attack of hemiplegia, tells me, and I have no reason to doubt his statement, that he has lately walked fifteen miles in one day. Yet he is still hemiplegic, and swings his leg in a very marked manner at every step. Were he suing some Company for damages, we might wonder how so much power for walking could remain with such decided paralysis.

He got into the train at the Caledonian Road station, on the North London Railway, and then remembered nothing more until he found people washing his face at Bow Station. He soon got well and went home. Unfortunately there is no evidence as to the kind of attack this patient had. I think it very likely that he had had some convulsive seizure. The paralysis was not increased.

Now I am quite safe in telling you that such a patient is liable to convulsive seizures from effusion of blood in the brain, but whether this convulsive seizure, if it were one, was so caused or not, I cannot say. If it were, it was the third effusion of blood.

The fifth was an effusion of blood in the retina, and this you will see for yourselves.

Now let us examine the patient who has suffered from these four attacks. His condition is pretty much like that of the patient (W. K.) who died, but it is not, I think, so far advanced. He has moveable rigid arteries. You see that the temporal artery is much curved, and, as in W. K.'s case, the brachial artery does not accommodate itself to the change produced by bending the arm. I do not wish to deny that such evidence of degeneration af arteries is at all uncommon in persons 53 years of age, but I hope it is far from normal, since we frequently find very much softer radial arteries, than this patient has, in people considerably older. For instance, yesterday, I had, amongst my out-patients, a man 85 years of age, also a woman 82, and another woman 76, whose arteries were very much better, I

cannot but think that it is a libel on old age to class these premature changes with the orderly decline of age. He had a small but decided arcus senilis.

The first sound of the heart was indistinct, and the heart's impulse was diffused, and there was a general heaving over the cardiac region. He had then hypertrophy of the left ventricle of the heart. His thorax was everywhere far too resonant. It was barrel-shaped, and the respiratory murmur was diminished.

He has also suffered repeatedly from gout, &c. ; indeed, for twenty years he " had had more pain than ease." His father had never had it, but three of his brothers had.

The pupils were very small, but are now dilated by atropine. Although this patient reads the newspaper and appears to see well, the changes in the retinæ are very striking. The optic disc is scarcely to be distinguished, except by the convergence of its vessels. Its colour is a sort of reddish-white, and this whiteness extends beyond the edge of the disc, which it obscures, and gradually fades away without any margin. The veins are much larger than the arteries.

There are a few very small effusions of blood near the yellow spot.

[I then spoke shortly of the paralysis. There was considerable loss of sensation on the paralyzed side. For further remarks on this part of the case which is purely physiological, and involves questions of extreme importance, see the paper on the Functions of the Thalamus Opticus.]

* * * * *

The patient left the Hospital towards the end of December. As I was very anxious to know how he went on, I called on him on December 30th, and was told that he had had a second fit. He fell, became insensible, and foamed at the mouth, and after the fit it was found that he had knocked a tooth out in the fall. But the things he chiefly complained of were difficulty of breathing and headache. He had had another attack of gout.

It is needless to give in detail the further progress of the patient, although, thanks to the permission of Dr. John Richardson, I had good opportunities of observing it. I have to thank this gentleman for many acts of kindness in connexion with the case, and for much valuable help towards the correct observation of the symptoms. In about the middle of January the patient suffered much

from attacks of sickness, in which he brought up nothing but a little mucus.

Towards the end of January his sight failed rapidly, and in about a fortnight he was practically blind. The margin of the disc was lost, and the whole background of the eye presented a mealy-white appearance. The arteries were only here and there to be seen, and the veins were partly obscured too. Near the yellow spot were several recent linear streaks of blood, and there was one also near a vein in the optic disc.

I again admitted him into the Hospital, but on February the 24th, his friends took him out. He was much worse; he had considerable pain in his head; had lost his appetite; was in low spirits. He was exceedingly exhausted when he got home, and next morning about seven he had six fits.

He died February 27th. Until his death he had frequent fits, and was in the intervals of the seizures, comatose. I saw one of these attacks, and in that the left—the paralyzed—side was the one convulsed. The right side was quite lax in this fit.

At the autopsy—made by Dr. Richardson, Mr. Powell, Mr. W. H. Ansell, and myself—we found disease of the optic thalamus,—the remains of an old hæmorrhage—extensive granular disease of the kidneys, and hypertrophy of the left ventricle of the heart, &c. For further details of the case, I refer to my next paper.

OBSERVATIONS ON AN ETHNIC CLASSIFICATION OF IDIOTS.

BY J. LANGDON H. DOWN, M.D., LOND.

THOSE who have given any attention to congenital mental lesions, must have been frequently puzzled how to arrange, in any satisfactory way, the different classes of this defect which may have come under their observation.   Nor will the difficulty be lessened by an appeal to what has been written on the subject.   The systems of classification are generally so vague and artificial, that, not only do they assist but feebly, in any mental arrangement of the phenomena which are presented, but they completely fail in exerting any practical influence on the subject.

The medical practitioner who may be consulted in any given case, has, perhaps in a very early condition of the child's life, to give an opinion on points of vital importance as to the present condition and probable future of the little one.   Moreover, he may be pressed as to the question, whether the supposed defect dates from any cause subsequent to the birth or not.   Has the nurse dosed the child with opium?   Has the little one met with any accident?   Has the instrumental interference which maternal safety demanded, been the cause of what seems to the anxious parents, a vacant future?   Can it be that when away from the family attendant the calomel powders were judiciously prescribed?   Can, in fact, the strange anomalies which the child presents, be attributed to the numerous causes which maternal solicitude conjures to the imagination, in order to account for a condition, for which any cause is sought, rather than hereditary

taint or parental influence.   Will the systems of classification, either
all together, or any one of them, assist the medical adviser in the
opinion he is to present, or the suggestions which he is to tender to
the anxious parent?   I think that they will entirely fail him in the
matter, and that he will have in many cases to make a *guarded*
diagnosis and prognosis, so guarded, in fact, as to be almost value-
less, or to venture an authoritative assertion which the future may
perhaps confirm.

I have for some time had my attention directed to the possibility
of making a classification of the feeble-minded, by arranging them
around various ethnic standards,—in other words, framing a natural
system to supplement the information to be derived by an inquiry
into the history of the case.

I have been able to find among the large number of idiots and
imbeciles which come under my observation, both at Earlswood and
the out-patient department of the Hospital, that a considerable por-
tion can be fairly referred to one of the great divisions of the human
family other than the class from which they have sprung.   Of course,
there are are numerous representatives of the great Caucasian family.
Several well-marked examples of the Ethiopian variety have come
under my notice, presenting the characteristic malar bones, the
prominent eyes, the puffy lips, and retreating chin.   The woolly hair
has also been present, although not always black, nor has the skin
acquired pigmentary deposit.   They have been specimens of white
negroes, although of European descent.

Some arrange themselves around the Malay variety, and present
in their soft, black, curly hair, their prominent upper jaws and
capacious mouths, types of the family which people the South Sea
Islands.

Nor have there been wanting the analogues of the people who with
shortened foreheads, prominent cheeks, deep-set eyes, and slightly
apish nose, originally inhabited the American Continent.

The great Mongolian family has numerous representatives, and it is
to this division, I wish, in this paper, to call special attention.   A
very large number of congenital idiots are typical Mongols.   So
marked is this, that when placed side by side, it is difficult to believe
that the specimens compared are not children of the same parents.
The number of idiots who arrange themselves around the Mongolian

type is so great, and they present such a close resemblance to one another in mental power, that I shall describe an idiot member of this racial division, selected from the large number that have fallen under my observation.

The hair is not black, as in the real Mongol, but of a brownish colour, straight and scanty. The face is flat and broad, and destitute of prominence. The cheeks are roundish, and extended laterally. The eyes are obliquely placed, and the internal canthi more than normally distant 'from one another. The palpebral fissure is very narrow. The forehead is wrinkled transversely from the constant assistance which the levatores palpebrarum derive from the occipito-frontalis muscle in the opening of the eyes. The lips are large and thick with transverse fissures. The tongue is long, thick, and is much roughened. The nose is small. The skin has a slight dirty yellowish tinge, and is deficient in elasticity, giving the appearance of being too large for the body.

The boy's aspect is such that it is difficult to realize that he is the child of Europeans, but so frequently are these characters presented, that there can be no doubt that these ethnic features are the result of degeneration.

The Mongolian type of idiocy occurs in more than ten per cent. of the cases which are presented to me. They are always congenital idiots, and never result from accidents after uterine life. They are, for the most part, instances of degeneracy arising from tuberculosis in the parents. They are cases which very much repay judicious treatment. They require highly azotised food with a considerable amount of oleaginous material. They have considerable power of imitation, even bordering on being mimics. They are humorous, and a lively sense of the ridiculous often colours their mimicry. This faculty of imitation may be cultivated to a very great extent, and a practical direction given to the results obtained. They are usually able to speak; the speech is thick and indistinct, but may be improved very greatly by a well-directed scheme of tongue gymnastics. The co-ordinating faculty is abnormal, but not so defective that it cannot be greatly strengthened. By systematic training, considerable manipulative power may be obtained.

The circulation is feeble, and whatever advance is made intellectually in the summer, some amount of retrogression may be expected

in the winter.   Their mental and physical capabilities are, in fact, *directly* as the temperature.

The improvement which training effects in them is greatly in excess of what would be predicated if one did not know the characteristics of the type.   The life expectancy, however, is far below the average, and the tendency is to the tuberculosis, which I believe to be the hereditary origin of the degeneracy.

Apart from the practical bearing of this attempt at an ethnic classification, considerable philosophical interest attaches to it.   The tendency in the present day is to reject the opinion that the various races are merely varieties of the human family having a common origin, and to insist that climatic, or other influences, are insufficient to account for the different types of man.   Here, however, we have examples of retrogression, or at all events, of departure from one type and the assumption of the characteristics of another.   If these great racial divisions are fixed and definite, how comes it that disease is able to break down the barrier, and to simulate so closely the features of the members of another division.   I cannot but think that the observations which I have recorded, are indications that the differences in the races are not specific but variable.

These examples of the result of degeneracy among mankind, appear to me to furnish some arguments in favour of the unity of the human species.

DELIRIUM TREMENS, WITH CLINICAL REMARKS.

BY DR. FRASER.

THESE cases have been made the subject of former clinical observations, and upon the present occasion I may make repetitions, but also further remarks. Judging from the official list of diseases kept in the Hospital, one might infer that the influence of the total abstainers was being shewn in the small number of cases of delirium tremens in 1865, viz., seven, and only one death; but this hope is blighted, because for the first half of the present year there are already seven cases, and one death.

Firstly, as to the cause of the disease. It would be well if we were always equally certain as to the remote cause of all other diseases, as we are of delirium tremens: for, although there may be doubts as to the proximate action of alcohol in the production of all the symptoms, there is no doubt that without the action of alcohol there can be no true delirium tremens. The poison is imbibed, and the effect follows as plainly as the shock follows the release of the electric fluid from the battery. The comparison may be further pushed, for, in both, individual immunities will be observed; but sooner or later all, more or less, succumb to the cumulative power of the agent. In some, the effect follows rapidly on an excessive debauch, even in persons not habitual drunkards, and then we have the "delirium e potu" of writers. In others, the effect may be slower of development, and follow the total abstraction of an accustomed stimulus, then we have the "delirium ebriosoram" of writers: although both Drs. Laycock, and Peddie, deny that mere abstinence will produce

the disease.   This nosological distinction reads very well on paper,
but when we come to the bedside, the line of demarcation becomes
invisible : for example, a non-habitual drunkard, who after a debauch,
is seized with " delirium tremens," *i.e.,* " delirium e potu," is in a
similar condition to an habitual drunkard, who from necessity or
choice has been deprived of alcohol, and delirium tremens supervenes,
i.e.," delirium ebriosorum," for both are suffering from the effects
of alcohol, merely differing in degree ; the one we may call acute,
the other chronic.   The doubt, however, is not whether alcohol is
the remote cause of the peculiar disorder, for no one thinks other-
wise ; but the point is whether the proximate cause is an excess of
alcohol circulating in the blood, and acting lethally in the nerve
centres ; or from the deprivation of an accustomed stimulus, by which
the tone of the nerve centres is morbidly lowered.   This question is
not one of theory merely ; but also of treatment, as to whether stimu-
lants are to be given, or withheld ; for it is clear, that if an excess
of alcohol is in the blood, instead of adding, we ought to eliminate ;
and, on the other hand, if the symptoms arise from a diminution
of power in the nerve centres, owing to the absence of an accustomed
stimulus, then alcohol will be the remedy.   So far as this point is
concerned, the seven appended cases stand thus :—

Nos. 1, 3, 5, 7, would appear to have been of the former class,
viz., the system saturated with alcohol.

> No. 1. Treated with alcohol ; fatal.
>
> „ 5. Treated with alcohol ; recovery.
>
> „ 3. Treated without alcohol ; fatal.
>
> „ 7. Treated without alcohol ; recovery.

Showing an equal number under each kind of treatment.

Nos. 2, 4, 6, of the second class—the system deprived of alcohol.

> No. 2 without alcohol ; fatal.
>
> „ 4 without alcohol ; fatal.
>
> „ 6 with alcohol ; recovery.

From the result of No. 6 it would appear that Nos. 2 and 4 might
have recovered if alcohol had been given, and this agrees with the
theory above stated.   Let us now inquire succinctly into the physio-
logical action of alcohol on the human body.

It is certain that alcohol is absorbed, for it has been detected in
the blood, the brain, the liver, the bile, the urine, and in the secre-

tions of all the serous membranes. It has been affirmed that it has a peculiar elective affinity for brain-matter; and Flourens has said especially for the cerebellum. It is a non-nitrogenized substance, and cannot form organized tissues; and its chief use is in the evolution of heat : although Liebig, says that it is oxidized in the body, and serves as food. Whence, therefore, arises its evil influence on the animal economy ? The revived humeral pathology leads to the opinion of a depraved condition; or, in other words, a poisoning of the blood from alcohol.

Alcohol is said, to take the oxygen of the blood (which would otherwise have gone to the normal oxygenation of the various tissues of the body), and thus to stop the ordinary waste of material; while its carbon and hydrogen are given off as carbonic acid, and water. Why, then, if the action of alcohol merely stops waste, should its action be so injurious ? Because the arrest of this waste throws into the circulation an abnormal amount of nitrogenous matter.

The resemblance between the convulsions attending delirium tremens, and those attending uræmic poisoning is close, and arises either from a similarity of action of the alcoholic, and uræmic poisons on the nervous centres ; or, from a retention of urea during the delirium tremens, such as happens in true uræmia.

Here comes the question, has it been noticed whether the urea is absent or diminished in quantity in the urine, and whether it is in excess in the blood in the delirium tremens ? An answer would involve a great deal more than I can here undertake.

May it be that the action of alcohol tends to the formation of urea, and that the latter causes the fatal symptoms, viz., the violent spasms, and convulsions ; or, may it be that the alcohol is converted into some compound, as yet unrecognised, capable of inducing these fatal symptoms ? If there be such a compound, we could thereby explain, why, after a deprivation of the accustomed stimulus, the fury of the symptoms may not be manifested until the compound is formed and circulated ? Again, if it be true, that in ordinary health, the greater portion of the alcohol imbibed is excreted by the lungs, skin, intestinal, and renal passages, it may be that when, from unknown causes, the alcohol is retained, and passes into the blood, an attack of delirium tremens is the consequence. This subject will be further alluded to under the treatment.

Leaving these undetermined points, we come to a practical application of your knowledge. You may be suddenly called upon in the dead of the night, and find a patient under restraint, apparently raving mad. At first, especially if you do not know the previous history of the patient, and this may, or may not, be correctly obtained by you, either from neglect, or because it is wilfully withheld; you will be in doubt whether it is a case of mania, febrile delirium, or delirium tremens, or even fits. Let us suppose that no further information is obtainable, and you are placed under a painful undecision, from the necessity of care for the patient, and safety to the attendants. Your first impulse might be to consign the man to an asylum. If you do so, he may recover in a few days, and will not thank you for your mistake; or, if he dies, some officious friend is sure to make out that it was a case of delirium tremens, and not insanity at all; and numerous troubles may arise from the mistake. Then what are the distinguishing marks? The mania, or delirium from cerebritis, meningitis, or fever, is seldom sudden; and insanity has always a period of incubation; whereas, in delirium tremens, although the disease may be approaching for days, the violent outbursts of delirium is generally sudden. In mania the flushed face (the fierce expression), (the sparkling eyes,) (the dry skin), and the parched tongue (if seen), are a diagnostic. If there is inflammation of the membranes of the brain, pain is generally produced by pressure on the eye-balls, and the persistent delusions, proclaim the character of the affection. In delirium tremens the skin is moist, the pulse generally soft, often weak, and not above the ordinary standard, the eyes and countenance, even under excitement, are subdued, the mind is occupied generally with horrid disasters connected with ordinary occupations,—this however, may happen also in mania. To help us, we may remember, that meningitis and cerebritis are rare diseases in adults, whereas delirium tremens never occurs before puberty.

The delirium attending fever cannot be mistaken for either mania or delirium tremens, for, even if the history of the case be unknown, the general aspect of the case is sufficiently characteristic. With all the distinctive marks we can institute, we must depend much upon the history of the patient, and if there is proof of intemperance, although we may find him quiet and obedient, let us look carefully, and if there should be the least tremor of the hands, be cautious, for,

in a few hours, we may find him in a wild, raving, uncontrollable, and fatal delirium tremens.

There is a point of much importance which, although not strictly connected with the present subject, may here be merely alluded to, viz., the diagnosis between a "fit" and a man "dead-drunk."

What are the most frequent pathological appearances of true delirium tremens?

There is no especial appearance in either the brain, spinal marrow, or the membranes, which can be placed as a constant effect of this disease; for all the conditions which have been seen by the many observers, have been noticed when there had been no delirium tremens, and all of them have been absent under the most aggravated and fatal cases of this disease.

In fifteen cases of idiopathic delirium tremens, the *post-mortem* appearances were as follow :—When an organ is not noted, it is supposed to have been healthy.

Head.

8. Ventricular and arachnoid serous effusion.
1. Sanguineous arachnoid effusion.
1. Sub-arachnoid gelatinous effusion.
2. Scalp and dura mater deeply ingested.
2. Brain and membranes much injected, and of a rosy-hue throughout.

Lungs.

1. Emphysematous.
2. Gorged with pus.
7. Gorged with blood.
1. Tubercular.

Heart.

3. Dilated.
1. Hypertrophy.
3. Fatty.
1. Effusion of blood in pericardium.
1. Fibrinous clot in pulmonary artery.

Liver.

7. Enlarged.

1. Fatty.
2. Cirrhosis.

Stomach.
5. Congested.

Kidneys.
1. Disorganized.

Out of eight cases of traumatic delirium tremens :—

Head.
4. Ventricular serous effusion.
2. Brain very vascular.
1. Membranes congested.
2. Arachnoid thickened, and opaque.

Lungs.
6. Congested.

Heart.
2. Hypertrophied.
1. Pericardial adhesions.
1. Fatty.

Liver.
5. Enlarged.

It will be seen, from the foregoing table, that the most frequent morbid appearance in both idiopathic and traumatic delirium tremens, was serious effusion into the ventricles of the brain and arachnoid cavity : next in frequency, congestion of the lungs. The heart was fatty in four cases. As regards the other organs, there was no uniform condition from which a certain inference could be drawn.

The foregoing does not accord with the statement of Dr. George Johnson, that the fatty heart is the most frequent pathological change : on the other hand, Dr. Olivier, of the 60th Rifles, states that the heart is not flabby : also, Dr. H. Jones has found the heart contracted, and in a state of tonic spasm.

The frequency of the serous effusion into the ventricles and arachnoid, at once merits attention, but as it was not a constant fact, it cannot be put down as the chief anatomical lesion; the same may be said of the lungs, and of the liver. The important fact is, that in every case, there was some organic lesion, and, therefore, we conclude that death is seldom caused by the action of alcohol alone; and that when death does occur, when there is no appreciable organic disease, it is the consequence of exhaustion from nervous excitement, and an imperfect supply of food and stimuli.

It is, however, of great importance to arrive at a correct diagnosis as to the presence or absence of organic affections, as well for prognosis as for treatment, as the tendency to death mainly arises from organic affections. We are, however, frequently left to attend to the ordinary symptoms of delirium tremens alone, although we may suspect, and even be sure, of the presence of organic diseases. Roesch says that pneumonia is the most inciting cause of delirium tremens, but I am sure that the pneumonia as often supervenes upon the delirium tremens. It is, however, not improbable that the blood,* changed by the action of alcohol, either chemically or physically, may be unable to pass from the right side of the heart through the lung capillaries, and a consequent congestion, and, ultimately, a pneumonia may be produced.

Treatment.—The main points of treatment have been briefly appended to each case. I may here add, that however much practitioners may differ as to the best drugs, if any, to be employed in delirium tremens, all are agreed as to the necessity for inducing sleep, and the frequent need for the employment of stimulants. In the "delirium ebriosorum" the exhaustion is so overwhelming, whether from depression, induced by a deprivation of alcohol, or from other causes, that nothing but the accustomed stimulus will rouse the fleeting strength; because, in this condition, the stomach will not receive or retain, the necessary food. If ever the proverbial saying were true, it is on such occasions,—"Give strong drink unto him that is ready to perish." In other words, what are we to do if the patient won't or can't eat? Dr. Inman, of Liverpool, has given us proof of

---

* The blood of drunkards does not redden, so rapidly as in others, on exposure to air.—*Bœcker.*

the wisdom of this ancient maxim, in which life was clearly sustained by alcohol alone for many days, in several cases.

In " delirium e potu," if the patient be young and healthful ; rest, and quiet, with nourishing soups, and moderate stimulus will generally effect a cure.   To give an apothegm : if the pulse be weak and easily compressed, the tongue and skin dry, and there be general restlessness, then you must stimulate, or else your patient will surely die of pure exhaustion, especially if of confirmed intemperate habits.

If the pulse be strong, and above 100, the tongue moist, and the muscular power unimpaired, then stimulants will not be needed, only leave the patient to a careful nurse, with orders for good nourishment, having ascertained that there are no complications, such as pneumonia, or pleuritis, or renal disease,—for such have to be specially treated,—and we may refer to Case No. 1, as a lamentable complication of organic disorder.

During the present anti-stimulant age there is a danger that the expectant mode of treatment will be carried beyond prudence, and that nature may be over-taxed in our anxiety to avoid the use of narcotism and stimulants.   This observation will apply to the use of opium, now so often condemned.   The recorded cases are too numerous to be put aside, in which this drug, when used in appropriate cases, has been very beneficial in calming the excitement, and arresting a fatal exhaustion.   If it be true that certain conditions of the brain are antagonistic to the effects of opium ;—if we could but learn these conditions, our use of the drug would be more scientific.   It is remarkable that, while in the treatment of pneumonia, and other inflammatory disorders, practitioners abjure, as a rule, the depletant, and apply to the supporting, if not actually the stimulating, treatment ; the opposite line of action is recommended in the treatment of delirium tremens.

This tendency to avoid the use of stimulants, and narcotics ; of the latter, opium being the chief, bids fair, if not guided by observation and discrimination, to be carried to an evil extent, for now, as heretofore, there are cases which require the immediate and large employment of both stimulants and opiates, and, therefore, a wholesale condemnation of the practice is wrong.   So far as my own experience goes, the anti-stimulating plan was only tolerably successful ; for, during the years 1863 and 1864, twenty-four cases were treated,

almost all without stimulants, and many without opium, and four died, being at the rate of seventeen per cent.

In 1865 seven cases were treated in the Hospital with a very moderate amount of stimulus, and only one died, and this death was from pleuro-pneumonia.

The seven cases up to July, 1866, have also been treated with very moderate stimulus, and little or no opium: in two cases the hypodermic injection of morphia had a very good effect.

Cases Nos. 6 and 7 must, however, be cited, as having derived much benefit from the administration of stimulants.

Judging, however, from the statistics given by Drs. Laycock and Peddie, the non-stimulant, and non-narcotic, treatment was very successful. The former had twenty-four cases and one death; the latter eighty cases and no deaths. If similar success, under similar treatment, with similar cases, result in the hands of other practitioners, the demolition of the old treatment will not be remote. Case No. 3 does not give much hope to depend entirely upon digitalis, although in Case No. 5 its beneficial effect was evident.

In a general Hospital there are not the necessary appliances for the security of patients who become violent, and maniacal, without having recourse to the objectionable practice of personal restraint. I am satisfied that the practice is generally injurious, and in many cases, if not the actual cause, materially hastens the fatal termination, as I believe it did in Case No. 2 and No. 4. The patients ought to be placed in a dark padded-room, and left to themselves. In the case of No. 6, and in similar cases if it were practicable, I believe the best results would have arisen if we had indulged the desire to leave the house, and with proper attendants had allowed the patient to walk himself down to fatigue; the probabilities are that sleep and restoration would have followed, at all events, the exhaustion would be of a healthful character, and very different from the prostration consequent on personal restraint, which produces a semi-normal irritation and annoyance, although the patient may not be apparently sensitive. Of course, this last recommendation can apply only to that class of cases in which the strength is unimpaired, and no local disease is present. In regard to the objection to the employment of stimulants, that a habit " *of drink* " may be induced, there is little or no fear of this, if not already present, becoming

permanent, for, in my experience, with the return of health, the patient will cease the indulgence. I may enumerate the various remedies which have been employed in the treatment of delirium tremens, but without entering upon their known or supposed modes of action, or comparing their relative merits, for the subject would lead me far beyond your time or patience.

Opium, the salts of morphia, camphor, tartar emetic, ammonia, digitalis, chloroform, the calabar bean, capsicum, iced-bath, &c., &c.

No. 1.—*Delirium ebriosorum, with fits.—Treated with opiates and stimulants.*

Charles Chase, aged 56, a labourer, was brought to the Hospital on the 23rd of September, 1862, at mid-day. This history was obtained. Five years ago, had delirium tremens; has been drinking largely of late, and the present symptoms, with occasional fits, have existed for about a week. The face is congested, tongue coated, bowels confined, loss of appetite, skin profusely perspiring, general tremor, no delirium. He is disinclined to answer questions, and when told to walk across the room, did so, after some hesitation, whistling at the same time. Shortly afterwards he suddenly jumped up and cried out as if in fear. This was followed by an epileptic seizure, after which he remained in a somnolent state for a quarter of an hour. At two o'clock P.M., had another well-marked fit, with rigidity of the muscles, foaming at the mouth, &c. Two drops of croton-oil were placed on the tongue, and spirit lotion applied to the head; to have milk and beef-tea for diet, with four ounces of brandy. The purge took good effect; in the evening vomiting commenced. Mist. Ammon. effervesc. was now prescribed; pulse feeble, 120. No opium was given on account of the epileptic complication. Though he did not sleep during the night, yet he remained comparatively quiet.

24*th.*— Has no appetite, is very thirsty; brandy to be discontinued. Passed the day without a return of fits, delirium very slight. Nine P.M., pulse 92; no opium to be given, but to have a scruple of calomel and jalap, with a saline draught in the morning. However, at three A.M (25th), he became unmanageable, frequently attempting to get out of bed; persuasion, with a little coercion, sufficed to keep him in check, but once he went so far as to strike his attendant. Ten A.M., he proceeded to strip himself, alleging that the room was full of water,

and could with difficulty be restrained, in fact, his vagaries were most extraordinary. The strait-jacket was not applied; at noon had four ounces of brandy, and also a grain of morphia, the latter to be repeated every four hours. Eight P.M., perspiring very freely, pulse 110. Ten P.M., can with difficulty be kept in bed, and refuses his medicine, so it was necessary to conceal it in brandy ; twelve P.M., no signs of sleep ; pulse 120 ; morphia repeated for the fourth time. Half-past one A.M. (26th), pupils contracted, but as he showed some signs of sleep it was thought advisable to push the remedy, and accordingly a drachm of tincture of opium was given. Half-past two A.M., in sleep, which continued till about half-past eight A.M., when his breathing was remarked to be very feeble, lips blue, pulse 120, and exceedingly small. He was immediately roused, and had some brandy given him, but was kept awake with difficulty. Cold effusion was applied to the head, and strong coffee ordered. After the lapse of two hours he perfectly rallied, and took a proper quantity of food ; he was now allowed to doze. Eight P.M., has no delirium.

27th.—There is now considerable bronchitis on both sides. To have Mist. Cascarillæ co. 4 tis hor., with counter irritation to the chest, the stimulus to be continued, as he was much exhausted. Eight P.M., debility more marked, with constant cough and much expectoration ; brandy mixture now ordered.

28th.—Signs of approaching coma, which gradually increased, and he died on the following morning. *Post-mortem* examination forbidden.

Remarks.—In this case we have an illustration of the error of inferring a universal from a particular case.

Some persons may allege that the opium had a baneful effect, and if it had been given after the supervention of the bronchitis, there would have been grounds for the opinion. On referring to case No. 3, we observe similar symptoms and results, when a comparatively small quantity of opium was given. Neither had the mechanical restraint any thing to do with the fatal result, as it was not employed. The probability is that this man would have recovered if the bronchitis had not supervened. It has been argued that opium kills in delirium tremens by acting as a depressant on the action of the heart, but I think, that the exhaustion consequent on prolonged excitement, will

T

be quite as, if not more, injurious. Although opium sometimes fails in inducing sleep, or quiet, this is no argument against its legitimate use.

No. 2.—*Delirium ebriosorum, with fits.—Treated with laudanum and mechanical restraint.*

Benjamin Stripling, aged 27, waterman, admitted September 15th, 1862, at four P.M. This patient, a robust, healthy-looking man, entered the receiving-room, expressing a desire that *the doctors* should examine the contents of two bottles of medicine which he fetched, as he strongly suspected his medical attendant was poisoning him (at the instigation of his wife). He also begged for an immediate antidote; his manner was restless and excited, the face flushed, hands tremulous, tongue furred, skin bathed in perspiration, and pupils dilated. He gladly consented to come into the Hospital, then suddenly changed his mind, as he wished to give his wife into custody, but was easily prevailed on to remain. He walked to his ward with hasty steps, incessantly talking of his wrongs. It was ascertained that he was in the habit of drinking largely, and that he had been delirious for about a week. · To have a drachm of tincture of opium, in brandy, at once. Later in the evening he became more unmanageable, and was therefore removed to a separate room, and confined by a strait-waistcoat, from which he made desperate attempts to relieve himself. A drachm of laudanum was now repeated, but with no effect; pupils not contracted. About two A.M., on the 16th, he had a violent convulsive attack, on the subsidence of which he seemed more quiet; a drachm of laudanum again repeated. From his manner, his attendant thought that he would now sleep, but at five A.M. he had become quite comatose, stimulants were ordered, but without avail, as death took place in an hour. Pupils uncontracted.

The *post-mortem* appearances were as follow :—Body well-nourished; face and neck very much congested. On removing the calvaria a large quantity of blood escaped; veins of the brain highly congested. Serum between the pia mater, and the arachnoid, with small portions of recent lymph between the convolutions of the cerebrum : left ventricle contained some fluid, but the right was perfectly empty. A considerable ammount of reddish serum was

effused at the base of the brain. Heart-substance somewhat pale and soft, having undergone fatty degeneration, but otherwise healthy. Liver in a state of fatty degeneration. Kidneys congested.

Remarks.—This case was viewed as one of arachnitis, and the origin of the inflammatory action cannot be entirely pressed upon alcoholism : although an alcoholic condition of the system would render the morbid action more virulent, whether arising from, or merely coincident with, an alcoholic saturation. In this case depletion would have been injurious. The question is, had the three drachms of laudanum, taken in twelve hours, anything to do with the death ? I think not, for we know the enormous quantities of this drug, which may be swallowed with impunity in all cases of nervous excitement; besides, a similar sudden demise took place in No. 3, in which opium could have had no evil action. It is more probable that the mechanical restraint was injurious, and I wish strenuously to advise against its use in all cases of delirium tremens.

No. 3.—*Delirium ebriosorum, without fits.*— *Treated with digitalis.*
(Reported by Mr. Adams, jun.)

William Page, æt. 28, a potman, admitted into the London Hospital, on the evening of Saturday the 1st of July, 1863 ; with delirium tremens. He had been long addicted to intemperance, but this was the first attack of " the horrors." The heart-sounds were normal, the pulse was 80, and inclined to be full. There being no signs of organic disease, it was determined to try Dr. Jones's treatment of digitalis ; accordingly, at seven o'clock, P.M., half-an-ounce of the tincture of digitalis was given ; at eight o'clock the pulse was 60, full and regular, the heart was acting as usual. At ten o'clock P.M., the dose was repeated, the patient passed a quiet and comfortable night, but did not sleep much. In the morning he did not seem so fearful, but was in a highly tremulous condition. At ten o'clock A.M., of the 2nd of July, the same dose was repeated ; half-an-hour after he vomited some bilious matter. He was put on a plain nutritious meat diet, and no stimulants; after the vomiting, he seemed quite easy. At three o'clock, P.M., a dose of half-an-ounce of the tincture of digitalis was again given, at four o'clock the circulation was unaffected, the pulse was 68, and

regular; he vomited again after taking the last dose of digitalis. Towards the evening he became much excited, wishing to go about the wards, pulling his bed-clothes about. At nine o'clock, P.M., two drachms of digitalis were given, but did not produce any obvious effect; he became more violent, and at eleven o'clock he tried to escape from the Hospital. It was found necessary to restrain him by quietly holding him in bed; he at first shewed some muscular power in endeavouring to free himself, but gradually the muscular exertions became objectless, and convulsiform, and he sank after loudly and repeatedly screaming murder. In thirty hours he took, two ounces, two drachms of the tincture of digitalis. The largest quantity given by Dr. Jones, in ten hours is, one ounce and a-half.

Post-mortem examination, fifteen hours after death.—Rigidity of right inferior and upper extremities, pupils dilated, body spare, but muscular. Dura mater adherent to skull throughout the whole of the occipital and parietal regions. Arachnoid apparently free from disease, vessels of pia mater, and chiefly between the sulci, moderately injected with blood, where a little serous fluid was lodged. About six drachms of fluid were found in the lateral ventricles: about an ounce and-half of bloody serum escaped from the spinal canal. Right side of heart much dilated, and the walls thinned: mucous membrane of stomach softened.

Remarks.—Was the effect of the digitalis too depressing upon an already weakened and dilated heart? I have always believed that the action of digitalis on the heart was depressant, but lately the contrary view has been held: viz., that it stimulates and augments the contractility of the organ, and, I must say, that I have lately seen cases of heart-disease, the result of which, bore out the latter opinion; for, under the use of digitalis the rhythm of the heart becomes healthy, and the contraction more normal. It is, however, to be observed, that all the cases treated with digitalis, which I have witnessed, have been unsuccessful.

No. 4—*Delirium ebriosorum, without fits.—Treated with laudanum and restraint.*

James Hutchinson, æt. 26, admitted the 20th of September, 1862, a tall robust drayman, habits, of late, most intemperate. The delirium

commenced some days prior to admission ; on the second and third day before admission, had attacks of convulsion; his delusions have been of a varied, and occasionally, of a violent character. On admission, he was calm, the face flushed, the eyes brilliant, tongue furred, skin perspiring very freely, hands tremulous. To take thirty drops of tincture of opium, in saline mixture, every four hours, also to have ten ounces of sherry during the night. About eight P.M., the delusion occurred that a stream of water was continually drenching him, and every few minutes he got out of bed, dragging his sheets on to the floor, having rearranged them to his satisfaction, he returned to bed, but only to arise and repeat the movement. Reasoning was useless, so it became necessary to remove him to a separate room, and a strait-jacket was applied ; this caused great annoyance, and he occasionally used vast efforts for release. To take thirty drops of laudanum immediately. This excited state continued for some hours, after which he gradually became more tranquil ; in reality, however, he was becoming comatose, for, at two A.M., on the 21st he, who, a few hours before seemed a model of muscular development, was a corpse. At the last the pupils were dilated, and the head and neck appeared gorged with blood. No *post-mortem examination* was allowed.

Remarks.—The sudden and fatal termination, in this and similar cases, naturally creates a sensation among the observers ; a few hours previous to the death, none, but those familiar with the character of the disease, would have anticipated the fatal event. In this case, the first impulse would be bleeding, to calm the frantic excitement ; but, it has been found that general depletion is not well borne, if not actually injurious. It is a serious question, whether the restraint by the strait-jacket was not injurious, by its depressing moral, and physical effect. It would be better to place the patient in a padded-room, in quietness and darkness. The quantity of laudanum adminstered was only equal to two grains of solid opium. As no examination was afforded, the condition of the brain and its membranes, can only be conjectured ; probably there would have been no pathological appearances at all, or possibly only a slight congestion of the pia mater ; or, on the contrary, there may have been indication of meningitis, with patches of recent lymph on and between the convolutions.

No. 5.—*Delirium ebriosorum, without fits.—Treated with digitalis laudanum, and chloroform.*

Henry Nash, butcher, æt. 45, admitted the 24th of October, 1864, under the care of Dr. Fraser. Reported by Mr. Adams, jun.

States that he has been accustomed to drink spirits, and beer to excess; has had two attacks of delirium tremens, within the last twelve months. Had not been drinking much till four days before admission. He was quite rational, hands and tongue tremulous. In the evening he became noisy and delirious. Thirty drops of laudanum were given with no effect, and, after three hours, ʒj. was given, after which he became quieter; a similar dose was to be given every third hour, if necessary.

25*th.*—Has passed a restless night. Nine P.M., has taken three drachms during the day, and now to have ♏. xxx.

26*th.*—At five A.M., had one drachm of laudanum; but becoming very troublesome, as the day advanced, he was ordered at eleven o'clock half-an-ounce of tincture of digitalis. Before taking the draught, the pulse was ninety, small and weak ; at noon, the pulse was 70, small, but regular. The senses were much clearer, and he said he felt very sleepy ; the tremor was somewhat less; at three P.M., the pulse was ninety, soft and regular; half-an-ounce of digitalis was repeated. Twenty-five minutes past three, P.M., pulse 65, soft and compressible, the tremor had diminished, and he dozed a good deal. Five P.M., talked rationally ; pulse 65, smaller and weaker. Nine P.M., again very delirious ; pulse 75, weak. The digitalis was repeated, in a pint of porter; an hour after taking the draught he became very violent ; pulse 90 : was removed to a private ward, a strait-waistcoat applied, and a drachm of laudanum given, with brandy. At midnight was still violent, chloroform was used.

27*th.*—At half-past one A.M., the dose of laudanum was repeated ; and again at five A.M. ; at eleven A.M., the pupils rather contracted ; at one P.M., took forty drops of laudanum. Three P.M., was quite quiet, slept, soon after, for four hours, and awoke collected.

28*th.*—Passed a good night, and is quite sensible. Took his food ; laudanum repeated at bedtime.

29*th.*—Improving, repeated laudanum at night, with porter.

November the 2nd.—Slept without the draught, took some brandy.
5th.—Convalescent.

Remarks.—It is difficult to say to which, if to any one, of the
remedies employed in this case, we are to attribute the recovery;
for, although the digitalis acted beneficially, it seemed to lose its
calming effect;* and the laudanum, useless at the outset, had a most
excellent effect at a later period, when given after the administration
of chloroform. In sixteen successive hours, he took one ounce and
a-half of digitalis. When we remember the cautious manner in
which this drug is usually employed, this appears a large quantity;
but it is nothing to what some practitioners give; one ounce for a
dose is not uncommon. Dr. Sloane, in a successful case, gave seven
drachms in thirty-six hours. In a case where ten grains of opium
had been given within twelve hours without effect, a half-ounce dose
of digitalis acted magically in inducing quiet.† We may fairly inquire,
before putting all the good down to the digitalis, whether the effects
of the opium had passed away?

No.6.—*Delirium ebriosorum, without fits.*—*Treated with opium and
stimulants.*

Charles Bishop, aged 40, lamp-lighter, was admitted at mid-day,
on October 17th, 1862, with a severe attack of erysipelas of the face,
of five days' duration. Has been in the habit of drinking large
quantities of spirits (chiefly gin), but for the last week he had de-
prived himself of his accustomed stimulus. Soon after admission
his manner was remarked to be restless and excited, he talked in-
cessantly, and when he closed his eyes he declared that objects ap-
peared around him. The point to which attention was drawn was,
whether this delirium was due to the extension of the eyrsipelatous
inflammation to the meninges of the brain, or the sign of approach-
ing delirium tremens? The history of the patient, and the sameness
of the treatment, point to delirium tremens. The delirium was not
of a violent character, on the contrary, of a peculiar busy and lo-
quacious description; if questioned, his answers were pertinent,

* See former experience of this drug, in the *Lancet* of March 8th, 1862,
p. 261.

† For the effect of digitalis, in delirium tremens, see cases by Dr. Jones
of Jersey.

when suddenly his mind would wander to other subjects.   His
hands were tremulous, and he was constantly picking at the bed-
clothes.   The tongue was thickly furred; bowels confined; the skin
bathed in a profuse sweat.   He did not complain of any pain, nor
did light or sounds annoy him.   Was ordered forty drops of laudanum,
liquor cinchonæ and saline mixture, every four hours, with a light
nourishing diet, and four ounces of brandy.   After this he slept
for some time, but passed an uneasy night.   October, 18th.—In the
morning he had an idea that we intended to perform some opera-
tion on him, and earnestly begged that we would not carry out
our intention, he usually warned us by saying, "Mind what you are
at, I am ruptured."   To take two scruples of calomel and jalap as the
bowels had not been relieved for some time.   At four P.M., he took
fifty minims of tincture of opium, which produced a little sleep.   At
eight P.M., having secretly armed himself with a boot, he got out
of bed and demanded his clothes, saying he was resolved to quit the
Hospital, as we intended to murder him.   He did not offer any
violence, but acted strictly on the defensive; argument proving of
no avail, he was removed by force to a separate room, but the strait-
jacket was not used.   Nine P.M., to have twelve ounces of gin
during the night, and a drachm of tincture of opium at once.   This
produced no sleep, although he became less violent.   Twelve P.M., the
dose of opium was repeated, pulse 110.   19th.—Half-past two A.M.,
no sleep as yet, he having had five and a-half drachms of opium in
thirty-six hours.   As the pupils were very contracted the laudanum was
stopped.   His apprehensions somewhat calmed, but still suspicious.
Eleven A.M., no sleep; to take a drachm of calomel and jalap, the
previous purge having had no effect.   Two P.M., bowels thoroughly
relieved, he now admits his former fears were groundless.   Still per-
spires very freely; tongue furred, but appetite good, pulse 98.   Eight
P.M., to take liquor opii, sed. $\mathfrak{m}$. xl.   During the night he dozed half-
an-hour; had occasional delusions, but was perfectly manageable.

    20th.—Appetite good; to have meat; is quite rational, but still has
an uneasy fidgety manner.   Eight P.M., pulse 86; a grain of morphia
was ordered, and repeated in three hours, soon after which the pupils
became contracted; and at three A.M. (21st), a third grain was given,
as he showed signs of returning restlessness.   He now slept for an
hour and a-half.   Eleven A.M., erysipelas fast disappearing, still con-

tinues to take twelve ounces of gin daily, appetite very good. Is now quite sane. Nine P.M., pulse, 78; to have a grain of morphia every three hours, after the second dose he slept soundly for five hours.

22nd.—Feels much refreshed, and has lost his former nervous manner; pulse, 68. Had eight hours' sleep during night, though he had but one dose of morphia. 23rd, returned to his ward, and in a few days, after gradually diminishing his stimulus, he was discharged. There can be no doubt of the benefit in this from the conjoint use of opium and stimuli.

No. 7—*Delirium ebriosorum, without fits.*—*Treated with stimulants.*

George Docker, aged 31, a gun-maker, of very intemperate habits, and who had been drinking to great excess for the last three weeks, was admitted with delirium tremens, in a mild form, on January 9th, 1863. Sixteen months ago he had a very severe attack, and since then frequent slight attacks. On the morning of the 7th he awoke with the idea that persons were conversing with him; on the following day he applied here as an out-patient. He pleaded very hard for admission, saying, that he knew by experience he would assuredly become worse. An opiate was prescribed, but without benefit, for he returned on the 9th, having run all the way from his home in the fear of an imaginary enemy.

On admission he had a peculiar anxious expression, with delusions, and complained of sleeplessness; there was slight tremor of the hands, a perspiring skin, costiveness, furred tongue, but good appetite. Was ordered tinct. opii, ♏ xl., but no sleep resulted. Half-past eleven A.M., judging by the foul state of the tongue, that the bowels were in a disordered condition, a scruple of calomel and jalap, followed by a saline draught, were prescribed, these produced only a moderate action. He passed the night in quiet.

10th.—In the morning slept for two hours after taking half a drachm of tinct. opii. Towards night, however, he had become more excited; the dose of opium was now repeated, but this time with no result; to have six ounces of brandy and three pints of porter, per diem. 11th. —Is decidedly worse, delirium more marked; face flushed; pulse quick and small. Three P.M., to have a drachm of laudanum immediately, and forty minims of the same; to be repeated every two hours.

12th.—Three A.M., still unmanageable, and for a time refused to

take his medicine; he showed great terror when left alone, as he fancied men and animals were about him. He continued all day in the same state. Nine P.M., to take liquor opii, ℳ xl. et æther, chlor. ℳ x. om: hori. Eleven P.M., pupils very contracted, skin perspiring freely, but he is more calm and rational.

13th.—Appears greatly exhausted, was ordered beef-steaks, and a quart of stout daily, in addition to his former allowance, viz., six ounces of brandy, and three pints of porter, and the opium and æther to be taken every three hours; from this date to the 19th he remained in the same condition. His answers were generally quite coherent, occasionally he became irrational, but never violent; he described with great accuracy his sensations, was aware that sleep was necessary to his recovery, but that it was prevented by the constant action of his busy brain.

His previous good appetite failed, his countenance became anxious, and exhaustion greater, bowels inclined to be costive, ordered Ol. Tiglii ℳ i.

20th.—Laudanum and æther changed to a grain of morphia, every four hours; ice applied to the head; on the night of the 22nd, a return of delirium, so much so, that it was found necessary to have recourse to the strait-jacket; at five A.M., on the 23rd, he fell into a sound sleep of six hours' duration, and afterwards at intervals during the remainder of the day.

24th.—He is perfectly rational and greatly refreshed. In the course of a few days, after gradually diminishing the amount of stimuli, he was discharged cured.

Remarks.—This case is remarkable for the time which elasped before sleep was obtained; for ten days* this man had only four hours' repose. Will the most violent advocate for abstinence point to anything but alcohol? to prevent the waste of tissue, and vital or heat-producing power, during this long period?

No. 8.—*Delirium tremens.—Death.—Autopsy.*

James T., rag-merchant, æt. 42, admitted July 6th, 1864, at five P.M., died at two A.M., on July 7th; had been ill, out of Hospital,

---

* Dr. Laycock gives a case of one month.

about seven days ; no further history.　At the *post-mortem* examination, there was found as follows :—

Brain.—Firm down to level of corpus callosum, soft below that portion.　Right half of the cerebellum and lateral ventricles full of rosy serum.

Heart.—Empty, pale, flabby and thin-walled (brown-paper-like thickness).

Lungs.—Gorged, and bases hepatized.

Stomach.—Coroded and ecchymosed.

Liver.—Large, but beginning to pucker.

Spleen.—Gorged with blood.

Kidneys.—Granular, and rotten.

No. 9.—*Post-mortem examination of E. R., a woman aged 47, died in delirium tremens ; previous history unknown.*

Body.—Very fat.　Skull-cap very thick, arachnoid opaque.

Brain.—Very soft, full of serum.

Heart.—Adherent to pericardium.　Right cavities full, walls very tender (rotten in fact, although only dead three days) and pale.

Lungs.—Gorged.

Liver.—Large and soft.

Kidneys.—Were waxy ; cut firm and smooth, and could be dented by finger ; hardly any distinction of substance ; contained some amyloid bodies.

ON THE DEATHS OCCURRING DURING THE YEAR 1865, AMONGST MR. HUTCHINSON'S PATIENTS.

COMPILED BY MR. HUTCHINSON AND MR. WAREN TAY.

On the 1st of January, 1865, ninety-eight patients were in the Hospital under Mr. Hutchinson's care. During the year, 1,114 were admitted, making a total of 1,212. During the year eighty-one deaths occurred, a ratio of one in fifteen, or $6\frac{3}{4}$ per cent.

In the following list (Table I.) the cases which ended fatally, are arranged according to date of death. We shall afterwards consider in groups some of the special causes to which the fatal event was due. We have included all the cases which were nominally under Mr. Hutchinson's care (being placed in his beds), and a few occur which were really treated by his colleagues, chiefly by Mr. Little. In these where the treatment involved any important operation, the name of the operator is given. The report, therefore, includes one-third of the surgical, in-patient, practice of the Hospital.

If we could get them, correct and detailed mortality records would be amongst the most valuable information which an Hospital can afford. We regret that on the present occasion our report is much less complete in many respects than we could have wished it, and we hope in future years to improve on our present plan. We have introduced a certain amount of information at several parts as regards cases which recovered, especially in connection with the important subject of hernia.

During the year we have been almost free from what may be called "Hospital-diseases," with the single exception of pyæmia. We have had no true Hospital gangrene, very little erysipelas, and only three cases of tetanus. Of the fatal cases of pyæmia and erysipelas, a very considerable proportion were admitted as such, and did not originate in the Hospital.

TABLE I.

LIST OF DEATHS ARRANGED ACCORDING TO DATE OF OCCURRENCE.

No.	Name.	Age.	Date of Death.	How many days in Hospital.	Cause of Death.
1	Mary Miller	32	Jan. 5.	12	Acute tetanus after a severe burn.
2	George Peel	33	Jan. 8.	13	Epistaxis. Sudden and unexplained death with dyspnœa.
3	Noah Nichols	24	Jan. 12.	38	Crushed toes. Amputation of toes. Pyæmia. Tetanus.
4	Henry Sharp	28	Jan. 15.	68	Abscesses in connection with disease of the iliac bone.
5	Louisa Smith	40	Jan. 15.	5	Erysipelas and pneumonia after excision of breast for cancer.
6	John Trouve	70	Jan. 17.	0	Shock of a burn.
7	Charles Flack	28	Jan. 18.	50	Diseased knee. Excision. Pyæmia, amputation.
8	John Cobbin	42	Jan. 21.	5	Inflamed legs. Erysipelas. Bronchitis.
9	Elias Bruce	1	Jan. 21.	5	Severe scald. Exhaustion.
10	William Kyte	62	Feb. 3.	10	Broncho-pneumonia after fractured ribs and wound of lung.
11	Phœbe Brown	11m	Feb. 14.	11	Exhaustion after a scald.
12	James Abbott	24	Feb. 23.	20	Renal anasarca and tertiary syphilis.
13	James Herbert	39	Feb. 23.	29	Pyæmia, &c., &c., after compound fracture of tibia.
14	Charles Dyne	66	Feb. 25.	4	Renal disorganization from stricture and calculus.
15	William Ives	25	Feb. 25.	3	Peritonitis from rupture of intestine from a blow.
16	Peter Gibson	19	Feb. 25.	1	Peritonitis from rupture of intestine from injury.
17	Sophia Wilkins	9	Feb. 27.	1	Shock from a severe scald.
18	John Adams	2	March 2.	3	Cancrum oris.
19	John Jones	39	March 14.	19	Compound fracture of skull and smash of brain.
20	Elias Levi	5	March 14.	18	Exhaustion after a burn.
21	Frederick Burrell	58	March 20.	3½ hours	Renal disease. Apoplexy mistaken for injury to head.
22	James Gerraud	34	March 21.	3	Traumatic delirium after compound fracture of ulna.
23	George Burdite	60	March 22.	2	Pyæmia after injury to finger.
24	John Phipps	15	March 25.	26	Pyæmia after primary amputation of leg.
25	Elizabeth Robinson	3	April 2.	13	Exhaustion consequent on a burn.
26	Edward Lees	17	April 5.	1	Exhaustion after phlegmonous erysipelas of leg.
27	William Hunter	5	April 9.	24	Pyæmia after primary amputation of thigh.
28	Sarah Antony	44	April 11.	6	Pneumonia after incised throat, (suicide).
29	Jeremiah Cochlan	29	April 12.	4	Traumatic gangrene after slight injury to arm.
30	Michael Quinlan	11	April 15.	19	Peritonitis after lithotomy. Large stone.
31	Sarah Armstrong	8	April 18.	11	Exhaustion consequent on a burn. Enteritis.
32	Thomas Sime	30	April 28.	2	Erysipelas of head and face from lacerated scalp.
33	James Winter	72	May 2.	33	Pneumonia, with renal disease, cystitis, and stricture.

No.	Name.	Age.	Date of Death.	How many days in Hospital.	Cause of Death.
34	William Gale	29	May 2.	4 hours	Contusion of brain from a fall.
35	Eliza Marshall	56	May 3.	24 hours	Peritonitis after operation for femoral hernia.
36	Japhet Page	50	May 12.	71	Pyæmia after amputation of leg for cancer.
37	Emily Bisiker	9	May 16.	48	Pyæmia after excision of cystic tumour in neck.—Mr. Little.
38	George Linnell	36	May 20.	20	Pneumonia after fracture of dorsal spine. *See* p. 341.
39	Eliza Harvey	9	May 21.	55	Pyæmia after resection of elbow-joint for disease.—Mr. Little.
40	Willliam Turner	41	May 21.	20	Pyæmia after secondary amputation for traumatic gangrene of leg.
41	Henry Fitch	26	May 26.	25	Pyæmia after amputation for diseased knee.
42	William Smy	55	June 7.	9	Disease of shoulder-joint (acute with osteitis).
43	William Whitmore	40	June 12.	3	Arachnitis after compound fracture of the skull.
44	William Dale	68	June 14.	49	Erysipelas of leg (of five days' duration) from old ulcers.
45	Mary Lynch	56	June 15.	5	Exhaustion after burn.
46	Frederick Parson	15	June 28.	18	Acute osteitis of ilium. Pyæmia.
47	John Moore	12	June 29.	20	Acute osteitis of ilium. Pyæmia.
48	James Driscoll	20	June 29.	14	Popliteal aneurism. Disease of heart.
49	Mary Jane Bralard	8	July 1.	12 hours	Hydrophobia. *See Lancet*, p. 511.
50	Julia O'Marao	65	July 18.	42	Acute inflammation of shoulder-jnt.
51	Thomas Charlton	33	July 28.	27	Paralysis of bladder and cystitis after fever.
52	James Mack	12	July 29.	95	Exhaustion from advanced disease of vertebræ.
53	Anne Halpin	1	July 30.	9	Gangrene of vulva and thigh after severe injury.
54	David Nicholls	53	August 9.	12 hours	Renal disease. Calculus: extravasation of urine.—Mr. Little.
55	Richard Morland	51	Sep. 3.	41	Pyæmia after secondary amputation of thigh for compound fracture.
56	Robert Mallett	70	Sep. 3.	5	Enlarged prostate and vesical and renal disease.
57	John Bacon	30	Sep. 18.	19	Epithelial cancer of penis. Amputation. Pyæmia.
58	William Adams	56	Sep. 18.	16	Pyæmia after compound fracture of tibia. Secondary amputation.
59	James Smith	55	Sep. 19.	14	Peritonitis after herniotomy.—Mr. Rivington.
60	John Garratt	45	Sep. 26.	6	Compound fracture of skull.
61	Henry Newton	47	Sep. 29.	4	Traumatic gangrene after compound fracture into elbow-joint.
62	Colman Symmonds	93	Oct. 11.	19	Cystitis and abscess in enlarged prostate.
63	James Garrett	25	Oct. 13.	5½ hours	Shock from compound fracture of pelvis.
64	Ellen Lee	2	Oct. 26.	10	Exhaustion after burn.
65	Mary Franks	38	Nov. 2.	86	Disease of hip-joint and iliac bone
66	Mary Davis	70	Nov. 2.	8 hours	Laceration of brain from injury.
67	Anne Fisher	53	Nov. 7.	15 hours	Tertiary Syphilis. Renal disease. Pleurisy.
68	Henry Aymes	35	Nov. 7.	5	Typhus fever. (Attempted suicide.)
69	Mary Pooar	2½	Nov. 13.	13	Congenital syphilis. Convulsions.
70	William May	35	Nov. 21.	19	Pyæmia after primary amputation of thigh.

No.	Name.	Age.	Date of Death.	How many days in Hospital.	Cause of Death.
71	George Wells	26	Nov. 28.	91	Phthisis. Ulcers on sternum.
72	Elizabeth Price	30	Dec. 3.	7	Peritonitis after herniotomy.—Mr. Dove.
73	Thomas Hubbard	30	Dec. 5.	7	Fracture of skull. Pyæmia.
74	Joseph Randerson	37	Dec. 10.	76	Aneurism of arch of aorta.
75	William Griffin	35	Dec. 13.	2 hours	Shock from extensive injuries. Fracture of pelvis, &c.
76	William Little	12	Dec. 15.	36 hours	Fracture of skull and compression of brain.
77	Joseph McCall	41	Dec. 18.	5	Broncho-pneumonia after fractured ribs.
78	Henry Richards	27	Dec. 19.	20 hours	Rupture of gall duct from a blow.
79	Emile Cohne	35	Dec. 20.	24 hours	Shock from severe burn in an explosion.
80	Michael Wall	70	Dec. 21.	3	Bronchitis after fractured ribs.
81	Mary Simpson	3	Dec. 25.	11	Exhaustion after a burn.

The first group which we shall take is that in which death occurred from the direct influence of the shock of the accident. But very few really die from this cause; in nearly all time is allowed for the supervention of some secondary form of disease, or, at any rate, for such an amount of reaction as to take the case out of the category of shock.

TABLE II.

DEATHS FROM THE IMMEDIATE SHOCK OF ACCIDENTS.   (*Six Cases.*)

The numbers in the first column refer to those in Table I.

No.	Age. Sex.	Nature of Accident.	Duration of Life.	Remarks.
17	9 F	Scald.	Twelve hours.	
75	35 M	Extensive injuries to pelvis, femora, &c.	Two hours.	
79	35 M	Severe burn in an explosion.	Twenty-four hrs.	
66	70 F	Laceration of brain.	Eight hours.	Complete insensibility without true stertor, respirations twenty in the minute, chiefly thoracic. Pulse regular, 100, of fair power. When admitted respirations so feeble that artificial respiration was tried.
63	25 M	Compound fracture of pelvis.	Five and a-half hours.	
6	70 M	Burn.	A few hours.	

Burns and Scalds.

THE total number of burns and scalds admitted was sixty, of these twenty-five were burns, and thirty-five were scalds. The gross mortality was twelve, or one in five, and, as indicative of the much more serious nature of the cases which came under the denomination of burns, we have the fact that nine of the twelve deaths were after burns, and only three after scalds. We have, therefore, a ratio of mortality of more than one in three for the burn cases, and of less than one in eleven, for the scalds. Many circumstances probably conspire to this result, but by far the chief is, that in burns a very large extent of surface is usually involved, whereas scalds are much more local and limited.

TABLE III.

BURNS AND SCALDS.   (12 *Deaths.*)

No. of case.	Age & Sex.	Nature of Injury.	Duration of Life.	Cause of Death.	Remarks.
1	32 F	Severe burn	12 days	Acute Tetanus	
9	1 M	Severe scald	5 days	Exhaustion	
6	70 M	Burn		Shock	He died on the day of admission.
11	11m F	Scald	11 days	Exhaustion	
20	5 M	Burn	18 days	Exhaustion	
17	9 F	Severe scald	1 day	Shock	
25	3 F	Burn	13 days	Exhaustion	
45	56 F	Burn	5 days	Exhaustion	
64	2 F	Burn	10 days	Exhaustion	
79	35 M	Burn, severe, in an explosion	24 hours	Shock	
81	3 F	Burn	11 days	Exhaustion	
31	8 F	Burn	11 days	Exhaustion Enteritis	A *post-mortem* was made in this case.

As regards the precise cause of death, in most of these cases, we regret to be able to state but little. The term " exhaustion " is applied to those cases in which the patient appeared to sink chiefly in connection with the debility produced, in part by pain, and in part by profuse suppuration. In almost all these. congestion of the lungs supervenes in the later stages, and in many it is the immediate cause of death. But few autopsies were obtained in these cases.

Of the cases which recovered, three were so severe that the patients remained in the Hospital more than one hundred days. In case No. 849, a boy of thirteen, had his trousers set on fire by a red-hot rivet, and was most seriously burnt in his thighs and perinæum; he was made out-patient after 139 days treatment. In Case No. 973, a boy again had his trousers set on

fire; one thigh was most seriously burnt, and around the knee all the skin was destroyed. It was feared that amputation would be needed, but, after 122 days careful treatment, he was made out-patient with good reason to hope that the sore would heal without material contraction. In case 201, a feeble man subject to fits, scalded himself so severely by pulling over a kettle of boiling water, that he was 105 days in the Hospital.

In no case was amputation found necessary for the effects of these injuries. Two children were admitted with scalds of the throat from attempting to drink boiling water, both boys of three years of age. In each case tracheotomy was abstained from, and both patients recovered well.

TABLE IV.

DEATHS IN CONNECTION WITH DISEASES OF JOINTS, SPINE, ETC.

No.	Sex. Age.	Nature of Disease.	Duration.	Cause of Death.	Remarks.
4	28 M	Abscesses in connection with disease of iliac bone Morbus Coxæ?		Exhaustion from profuse suppuration	68 days in Hospital.
7	28 M	Chronic disease of knee, with great displacement	6 months	Excision of knee, Pyæmia Amputation	The death was from osteomyelitis and pyæmia consequent on the excision. Excision, December 7th; Amputation, Dec. 22nd; Death, January 18th.
39	9 F	Chronic disease of elbow. The girl was in very fair health at the time of the operation		Resection of elbow. Pyæmia	Mr. Little's patient. In this case there could be no doubt that the pyæmia was the direct result of the operation. Death 1 month after the excision.
41	26 M	Chronic disease of knee. Synovial membrane in a gelatinous condition	3 months	Amputation, 14 days Pyæmia	A fortnight after disease commenced he was obliged to take to his bed. He had refused amputation until the very last.
42	66 M	Acute disease of shoulder - joint with osteitis of humerus	6 months	Exhaustion	Absorption of inner part of head of humerus. When admitted he was too ill to permit of resection.
47	12 M	Acute osteitis of ilium, involving the hip-joint	2 weeks	Pyæmia	This case, and the following, were instances of acute osteitis of one iliac bone, following a slight injury, and attended by all the symptoms of pyæmia.

Age.	Sex. Age.	Nature of Disease.	Duration.	Cause of Death.	Remarks.
46	15 M	Acute osteitis of ilium involving the hip-joint	2 weeks	Pyæmia	See preceding case.
50	65 F	Old dislocation of shoulder Attempt at reduction Inflammation of joint	4 years	Acute inflammation of shoulder joint, with absorption of head of bone	She was admitted quite drunk. A dislocation was found, and an attempt at reduction made. It failed. A second attempt was made under chloroform. Acute suppuration of the joint followed, and she sank exhausted 42 days afterwards. See *London Hospital Reports*, vol. ii, p. 349.
52	12 M	Caries of Vertebræ Paraplegia Angular curvature Abscess above and behind anterior superior spinous process of ilium	"Since he was a child"	Exhaustion	Sensation was good; he could just move both legs. He wasted to a mere skeleton.
65	38 F	Disease of hip-joint and iliac bone	4 months	Exhaustion from most profuse suppuration & severe pain	No history of injury. The least movement gave intense pain. She was admitted in a state of extreme illness.

During the year excisions of the larger joints have been avoided as much as possible, from fear of pyæmia. In no case was the head of the femur excised. None of the fatal cases of hip-joint disease were, however, in the least suitable for relief by that operation. In each there was extensive implication of the adjacent iliac bone, and the patient's state of health from the time of admission forbad any serious operation.

The favourite treatment for hip-joint disease has been by immobilisation, effected usually by the plaster of Paris bandage. In this way very satisfactory results were often obtained. Several cases were under care, in which excision might by some have been thought desirable, but it is not our impression that any suffered by the avoidance of this measure.

The old man who died of disease of the shoulder-joint, was also too ill when admitted to allow of the performance either of excision or amputation.

The fatal case of excision of the knee-joint, was the only one in which, during the year, that operation was performed.

Two other cases of resection of the elbow-joint occurred, and in both the result was good.

TABLE V.

DEATHS FROM DISEASES OF THE URINARY ORGANS. (*Nine Cases.*)

No.	Age.	Nature of Disease.	Remarks.
12	34	Syphilitic ulcers on leg Anasarca Suppression of urine Refusal to take food Melancholia Obstinate vomiting	An autopsy was refused. A pale flabby man. His first serious symptom was almost total suppression of urine, and at the same time he became melancholic, and refused to eat. A few days later vomiting set in.
14	66	Stricture (30 or 40 years) Calculus (many years) Extravasation of urine Renal disorganisation	He came in in almost a dying state from extravasation of urine and sloughing of scrotum. Incisions were made in the perineum. A large calculus was detected in the bladder and removed at once. The result of the removal of the calculus under these desperate conditions was to give very decided relief. For a day or two it seemed quite possible that the man might rally. At the *post-mortem* examination the kidneys were found disorganized and wasted.
1	58	Bright's disease of kidney Apoplexy Disease of retina Coma Breathing stertorous and almost wholly thoracic Heart's action continued for five minutes after cessation of respiration	Admitted 7·30 P.M. History of having fallen great height. Not accustomed to "fits." Slight laceration over left eyebrow, upper lip lacerated. Pupils contracted to "pin's points." Pulse full and compressible, 50-75 per minute. Breathing stertorous, limbs rigid, but he could feel better with legs than arms. 8·35. pupils widely dilated and fixed. 10·30, breathing wholly by chest, movements of abdomen not synchronous with those of chest. 11, breathing ceased, pulse continued for full five minutes. *Ophthalmoscopic examination.*—Apoplectic extravasations, one in particular on right optic disc. Left optic disc not well seen. Disease of retina. *Autopsy.*—An immense blood-clot distended the lateral, third and fourth ventricles. Kidneys, granular, and heart hypertrophied.
33	72	Stricture, 30 years Perineal fistula, many years Renal disease Cystitis Pneumonia, 1 week	A poor, decrepit, old man, exceedingly ill. He had been treated at St. Bartholomew's Hospital twenty-nine years ago for stricture. Many years ago Mr. Simon, at St. Thomas's Hospital, punctured his urethra in the perinæum, and ever since almost all his urine had passed through the fistula. Urine escaped freely by the fistula, and a instrument could be passed through it into the bladder, but not through the stricture. His legs were œdematous. He improved for a time, but at length had pneumonia and died. There was no *post-mortem* examination.
51	33	Paralysis of bladder. Retention. Cystitis after fever, 7 weeks	Seven weeks before admission he had "fever." His urine "dribbled away." One day left leg swelled, abdomen examined, bladder full, two quarts of urine drawn off by surgeon attending him. Phymosis, prepuce slit up. No. 8 passed easily. He gradually sank, and died exhausted.

No.	Age.	Nature of Disease.	Remarks.
54	53	Stricture, 20 years Calculus? Kidney disease Extravasation of urine	Admitted with extravasation into penis and scrotum. Scrotum immensely swollen. Catheter could not be passed. Incisions. His face was puffy, legs œdematous, looked albuminuric. In the evening a catheter was passed by Mr. Little, who thought he felt a stone. He died early next day. Autopsy forbidden.
56	70	Enlarged prostate Hæmaturia after use of instru- ments Pouch in front of bladder Vesical and renal disease	After use of instruments, before admission, he had hæmaturia, and became very ill, almost unconscious. There is no difficulty in passing a catheter a certain distance apparently into the bladder, but on with-drawing and pushing in again it goes further. Large quantity of blood drawn off. The probability is that a catheter had only entered a pouch in front of the blad-der before, and the retention had not been relieved. He became comatose, and died.
62	93	Abscess in enlarged prostate Large pouch in front of prostate Cystitis	He was so deaf that it was impossible to get any history.
67	53	Ulcers on leg with œdema Syphilitic disease of spleen Kidney and liver Pleuritis Hydrothorax Collapse of lung	She was admitted in the afternoon, and died early next day. At the autopsy cicatrices were found in capsules of kidneys, spleen, and liver. There was one lardaceous deposit in spleen as large as a horse-bean. There was a large quantity of fluid in the pleural cavity, chiefly on the right side, and a few flakes of recent lymph on pleura. The right lung was collapsed and pneu-monic.

Most of the above cases are in sufficient detail to explain themselves. Two of them were in every sense medical patients, the urinary element con-cerning the kidney only. One of these was (Case 21) put into the surgical accident ward in the belief that he had received an injury to the head, as he had been picked up in a wood-yard quite insensible with a cut on the forehead. The ophthalmoscope used while he was dying, shewed albu-menuric retinitis, and led to the conjecture that he was suffering from apo-plexy. In the second (Case 67), the patient had previously been under Mr. Hutchinson's care, six months before, for tertiary syphilis, and came back dying with hydrothorax, the result in all probability of renal disease.

Of the other strictly surgical cases, two of them are instances of old men dying from that form of cystitis which so often occurs in the termination of long-existing enlargment of the prostate, and is the result partly of the retention, and in part of the instruments used for its relief. They were aged respectively 70 and 93.

In Case No. 72, an old man had been for many years placed in a condi-tion of comparative comfort by the establishment (by Mr. Simon), of a direct perinæal fistula. Through this the whole of his urine had escaped, and he had never since suffered either from retention or from abscess. He

was admitted partly on account of deep corneal ulcerations. His death was from pneumonia, probably in connection with renal mischief.

In Case 33, paralysis of the bladder and cystitis had come on in connection with typhus fever.

The remaining cases are examples of neglected stricture, and illustrate instructively the usual terminations of such. One of them is mentioned also in the Lithotomy Table for this year, and goes to shew how fallacious statistics are unless duly explained. It is true that a calculus was removed from this man, but the whole of his perinæum was in a condition of gangrenous suppuration at the time, and the man was so ill, that it was not thought wise to take him from his bed to the Theatre. As the membranous urethra was already laid bare, and a large stone in the bladder discovered, it was deemed best to enlarge the wound and remove the concretion. Excepting in the fact that this was done, the case has no relation to "Median Lithotomy."

Cases in which death was due to medical disease.

The following cases ought not properly to have been in the surgical wards. In some there was no surgical ailment whatever, the diagnosis having at first been mistaken, and in others the surgical complication, although most prominently attracting attention, was really of inferior importance to the medical one. In all death was certainly due to a medical cause :—

CASE 21.—This patient died of apoplexy; but as the fit had occurred when he was alone, and as he had cut his head in falling, it was at first supposed to be an injury to the head.

CASE 51.—The only surgical element in this case was retention of urine; but this had followed a severe attack of fever, and was possibly in connection with disease of the spinal cord.

CASE 67.—The woman, who had formerly been in the surgical ward with tertiary syphilitic ulcers, was re-admitted with general anasarca and effusion into one pleural sac. She died during the night after her admission.

CASE 68.—A young man attempted suicide by cutting his throat during the stage of mental disturbance preceding typhus fever. The injury to the throat was trivial, and he died of the fever (under the care of the physician, but not "transferred").

CASE 69.—A little puny child, under treatment for congenital syphilis, with rash, of which she was nearly well, had repeated attacks of convulsions, and died probably from cerebral disease.

CASE 71.—A man with strumous ulcers in the sternum, had also phthisis, and after three months stay in Hospital, died of the latter.

Cases in which death was directly due to Surgical Operations.

It is most imperative that surgeons should keep clear accounts as regards the deaths coming into this category. We include in it only those cases in which death followed in such a relation to the operation, that there was every reason to believe that had the operation been avoided, the patient would have lived much longer. We do not include those in which it is probable that the operation, although it did not prevent, did not hasten, the event, nor those in which the risk of death from the disease, was as great and as imminent as that from the operation. Our list, then, comprises all in which the operation either directly caused or materially hastened the patient's death :—

CASE 5.—A fairly healthy lady, a governess, had the right breast, and some axillary glands, removed on account of rapidly growing cancer. Erysipelas attacked the edges of the wound and spread widely. She had acute pleuro-pneumonia, and died on the fifth day after the operation.

CASE 7.—A man was admitted who had partially recovered from an acute attack of destructive synovitis of the right knee-joint. The tibia was displaced outwards and backwards, and the limb quite useless. There appeared some probability that he might recover from the disease with a stiff and dislocated knee. To avoid this event resection was performed. Osteo-myelitis followed, and, in spite of amputation a fortnight later, he died of pyæmia.

CASE 30.—A healthy lad, of 11, died, after lithotomy, on the 19th day. The stone was a very large one, but no difficulty occurred in the operation. He had symptoms of peritonitis on the third day. The tube for the wound had not been used.

CASE 36.—A man, aged 50, died of erysipelas and pyæmia, after amputation below the knee for epithelial cancer of the leg. The cancer was very extensive and painful; but he had had it for some years, and might, perhaps, have lived another year if the operation had not been done.

CASE 37.—A girl, aged 9, under Mr. Little's care. She was in good health, but had a deep-seated cystic tumour in the root of the neck; after several attempts to cure it by injections, &c., it was dissected out, the dissection passing deeply towards the first rib. Death from well-marked pyæmia followed.

CASE 39.—A girl, aged 9, under Mr. Little's care. She was in good health, but had chronic strumous disease of the left elbow-joint. Resection was performed, and death from pyæmia followed it.

CASE 50.—This case has already been published. (See *London Hospital Reports*, vol. i.) The patient died of destructive inflammation of the shoulder-joint after an attempt to reduce an old dislocation.

CASE 57.—A man, aged 30, was admitted with rapidly-spreading epithelial cancer of the penis, which had already implicated the glands of the groin. Although in fair health he had a rapid pulse, and the day before the operation a severe rigor occurred (ague?). The penis was amputated, and the glands dissected out. After the operation he had repeated and violent rigors, and several free hæmorrhages from the wound in the groin. He died of pyæmia. This poor fellow could not have lived many months had the operation been avoided, as the disease was rapidly spreading, and his death would have been a most painful one.

We do not include any of the fatal hernia cases in this category; since in none was the operation resorted to, until it was urgently demanded. Nor do we include cases in which osteitis and pyæmia followed primary or secondary amputations, since these events were just as likely to have resulted from the original injury, as from the amputation. Indeed in some, if not most of the secondary amputations indications of pyæmia, were already present. Nor do we include Case 14, in which lithotomy was performed, for the man was admitted in an almost dying state with sloughing of scrotum, &c.

Looking at the converse side, there does not appear to be any one case respecting which it might be the thought that a timely* operation would have prevented the fatal event. Perhaps, we ought to except Case 41, in which a man died after amputation for disease of knee-joint, who had for two weeks refused the operation, and only submitted when he found himself rapidly sinking. It is possible, also, that excision of the head of the humerus, in case 50, might have been advantageous.

Remarks on certain special causes of death.

Tetanus.—Two patients died of traumatic tetanus—one man and one woman. In the latter the disease was very acute and well-marked; in the other it was less so, and was in conjunction with pyæmia. Both originated in the Hospital; one after a severe burn, the other after severe crush of the toes, which had necessitated amputation of several. Both cases occurred in January, and the patients died in the same week. A third case of traumatic tetanus occurred during the year, but it was not a very severe one, and the patient recovered.

* We use the word "timely," of course, only in reference to the period that the patient was under care in the Hospital.

Erysipelas.—Five patients died of erysipelas. In one, an old man, who had been several weeks under care for ulcerated legs, and was in good general health, had erysipelas attack his leg, spread rapidly to the thigh and trunk, and cause, death within a week. Erysipelas had occurred in other patients in the ward, and near his bed. In a second, the patient died of erysipelas with pneumonia, after excision of the breast. The three other patients all came into the Hospital with erysipelas ; one of them was admitted in a very bad condition, and died the next day ; another died on the second day after admission, and the third on the fifth day. Several other very severe cases of erysipelas were admitted as such, and recovered. In one of these the whole of one lower extremity was involved in celluto-cutaneous inflammations, and free incisions were required (at intervals) from the great trochanter to the toes.

Pyæmia ranks as a cause of death in seventeen cases. We have, however, used this term rather liberally, and have made it include all cases in which symptoms of blood-poisoning, attended with rigors, followed wounds or injuries. Most of the cases were, however, well marked. In case 23, an old man was admitted with symptoms of acute and advanced pyæmia, which had followed an injury to the finger resulting in necrosis. He lived only two days after admission. On June 10th and 11th, two boys were admitted, with almost precisely similar symptoms in each, acute inflammation of one iliac bone having resulted as the consequence of a slight contusion. Both were pyæmic and died.

All the cases of pyæmia occurred in connection with injuries to bone, excepting two—cases 37 and 57.

We defer a more detailed examination of this fruitful source of surgical mortality to a future report.

Traumatic gangrene.—Three patients died of traumatic gangrene. An adult man, of intemperate habits, in whom gangrene of the whole upper extremity followed a contusion with slight wound. A child, aged 1 year, who had gangrene of thigh, vulva, &c., after having been run over, and a man, aged 47, in whom gangrene followed a compound fracture into the elbow-joint. In a fourth case, amputation was performed for traumatic gangrene of the leg, after compound fracture of the tibia. The man, who was in a desperate

state at the time, rallied, and did well for a while, but ultimately died of pyæmia.

Peritonitis from rupture of viscera.—Two patients died of rupture of intestines from blows.   One had been kicked, the other had re-received the pole of a car into his abdomen.   These two young men died on the same day.   In a third case a man died of acute peri-tonitis after a blow on the abdomen, and at the autopsy bile was found in the peritoneum, and there was rupture of the gall-duct.

STATISTICS OF THE YEAR'S HERNIA CASES.

We have reported in the following list all the cases of strangulated hernia, in which the symptoms were sufficiently severe to require admission into the wards.   The statistics of hernia operations may mislead greatly if we do not consider together with them the other instances of strangulation in which milder measures succeeded. It is obvious that if a surgeon is accustomed to operate early, he will operate on many mild cases, and will have proportionately good results, whilst a surgeon who is very presevering in efforts at taxis, will probably operate only on the more severe cases, and will have worse herniotomy statistics.   These fallacies must be allowed their due weight in all attempts to determine the relative value of the different modifications of operation.

Most of the cases in the following list will explain themselves. None are included but those in which the strangulation was really severe, and, in most, several attempts at reduction had failed.

It will be seen that but few cases of *inguinal* hernia were operated on during the year.   In this form, for reasons explained by Mr. Hutchinson in last year's volume of *Reports,* special pains were taken to obtain reduction by taxis, and it was sometimes considered justifiable to wait longer than in cases of femoral hernia.

One case (26) operated on was peculiar on account of its large size, and the fact that although it had been down only eight hours, the man had already passed into collapse.   The tumour was as large as an adult head, and was, therefore, very difficult to manipulate in the efforts at taxis.   The man's condition did not admit of any delay, he being cold and almost pulseless, otherwise the cautious use of ice might very probably have led to success.   Chloroform was given, and taxis being again found impracticable, the constricting bands

were divided external to the sac, and reduction without opening the latter effected.   The old man recovered well.

In most of the cases of femoral hernia, in which operations were performed, the "precautionary" use of mercury was resorted to. Calomel, in grain-doses every three hours, was ordered immediately after the operation, and without regard to any symptoms which might be absent or present.   If, on the second day the abdomen was soft and painless, the mercury was suspended, but if there were any signs of commencing peritonitis, it was continued, and in larger doses. Thus, by not waiting for symptoms, it was hoped to be beforehand with the inflammation.   The results seem to justify a further trial of the plan.

In all cases of operation it was endeavoured to avoid opening the sac, but in several this became necessary during its performance. When irreducible omentum was encountered, it was left *in situ.*   In one instance (Case 17.) the intestine gave way a few days after the operation, a fæcal fistula formed, and a large portion of sloughy omentum came away.   This patient did remarkably well, as such cases often do.   She never had any indications of general peritonitis. Calomel and opium had been given from the first.   The discharge of fæces ceased in about three weeks from its commencement, and the fistula closed.

TABLE VI.

THE YEAR'S CASES OF STRANGULATED HERNIA.

No.	Age.	Sex.	Form of Hernia.	Treatment.	Result.	Remarks.
1	39	F	Femoral (left) large; some years; strangulation 14 hours	Operation; sac opened; adherent omentum left in the sac	Recovered	40 days in Hospital.
2	53	F	Femoral; three months; more than 24 hours' strangulation; about size of an egg	Operation without opening sac	Abscess in abdominal wall. No peritonitis	Discharged, cured, on 27th day.
3	56	F	Femoral; right size of small ostrich's egg; 5-6 years; strangulation 2 days	Operation; calomel treatment afterwards	Death in 24 hours	Sac opened, bowel reduced, old omentum left in sac. At *post-mortem*, peritonitis. See *London Hospital Reports*, Vol. ii. p. 405.

No.	Age.	Sex.	Form of Hernia.	Treatment.	Result.	Remarks.
4	63	F	Femoral; size of large walnut; 20 years; strangulation 5½ hours	Operation without opening the sac	An abscess in cellular tissue. Discharged cured, on 35th day	Vomited matter not stercoraceous.
5	63	M	Left femoral; size of an egg; parallel with Poupart's ligament; as large as a walnut for 20 years; rather more than 24 hours' strangulation	Operation without opening the sac	On 4th day effusion into sac. 10th day effusion diminishing. 27th, effusion gone, only omentum left	At the time of the operation he was in a paroxysm of spasmodic asthma.
6	30	F	Femoral, left; rather more than 48 hours' strangulation; symptoms severe	Operation; the sac was opened, but the intestine was not seen (Mr. Dove)	Peritonitis came on. Calomel ordered. She died on 8th day	There was no symptom of peritonitis before the operation. *Post-mortem.* — General peritonitis. No perforation of intestine whatever.
7	42	F	Femoral, right; 10 years; small egg; 53 hours' strangulation	Operation; sac not opened; calomel treatment afterwards	6th day quite comfortable. Discharged, cured, on the 38th day	
8	24	M	Inguinal	Taxis	Sent out cured in 4 days	
9	70	M	Inguinal (right); size of fist; 14-15 years	Taxis; warm bath	Reduction without chloroform	
10	44	M	Inguinal	Taxis under chloroform (Mr. Little)	Reduction, cured 8th day	Supposed three days' strangulation.
11	55	M	Inguinal (right); 4 years with a truss. Ascites and distension of hernial sac simulating hydrocele	Operation; sac opened (Mr. Rivington)	Death on 15th day Peritonitis. Disease of liver	Came down 9 days ago. He was sick next day, but continued at work till 3 days ago. He went to out-patients' room; was tapped and a quantity of fluid drained off. He was sick in the night. Tumour as large as two fists He was jaundiced before the operation.
12	36	M	Inguinal right; 10 years.	Operation without opening the sac (Mr. Rivington)	Sent out, cured, on 22nd day	13 hours' strangulation.
13	55	M	Inguinal (right); 2 fists; 14 years; 30 hours' strangulation	Warm bath; taxis	Sent out, cured, on 7th day	The taxis had been tried repeatedly; there was some little impulse.

No.	Age.	Sex.	Form of Hernia.	Treatment.	Result.	Remarks.
14	31	M	Inguinal (right)	Ice for 2 hours; taxis	Reduction after some perseverance	A very tight stricture could be felt about an inch below ext. abd. ring; impulse above this, but not below it. It had been down about 24 hrs., and he had been very sick.
15	61	F	Femoral, right	Operation; sac opened (Mr. Little)	Cured 41st day	Doubtful history of strangulation for four days. Neck of sac instead of being on inner side, was pushed in front or almost between the vein and the artery. — See *London Hospital Reports*, vol. ii., p. 293.
16	53	F	Femoral	Taxis	Left at own request 12th day	
17	53	F	Femoral, right; 6 years' duration; 5 days' strangulation	Operation; sac opened; omentum and gut both returned; mercurial treatment afterwards	On 69th day discharged	The hernia was the size of a fist. There was a stercoraceous odour of the breath. A fæcal fistula formed afterwards, and the omentum sloughed. It healed well.
18	57	F	Femoral	Ice. Taxis		She said she had not been ruptured till the day before; probably omental. Out-patient on 7th day.
19	18	M	Inguinal	Taxis	Reduced	
20	64	F	Small femoral	Taxis	Reduced	Went out on 15th day.
21	49	M	Inguinal, left	Taxis	Reduced	Went out on the 7th day.
22	32	M	Inguinal, right	Ice. Taxis	Reduced on 3rd day	Went out on 8th day. No "impulse" on admission.
23	1¾	M	Inguinal	Taxis	Reduced	Taken out next day.
24	40	M	Inguinal, small	Ice. Taxis	Irreducible	Complicated with hydrocele, probably only omentum. Patient avowed he had only had it a few days.
25	78	M	Inguinal (right), very large; 14-15 years	Ice. Taxis	Partial reduction	He went out on the 53rd day.
26	70	M	Immense scrotal	Operation without opening the sac	Cured on the 50th day. Partially reduced	He had had a hernia for 20 years; strangulated for 8 hours. He was in great collapse at the time of the operation.

OPERATION FOR REMOVAL OF AN EXTRA-UTERINE FŒTUS.

COMMUNICATED BY MR. MᶜCARTHY.

E. R., æt. 32, residing at Hackney, mother of four children, all living, menstruated for the last time in July, 1865, having always previously been regular. She considered herself pregnant, and reckoned her time from that date. She never had felt any movement of the child in any of her previous pregnancies, nor did she in this. She described her sensations as being very different from any she had formerly felt: but, no doubt, the later events influenced her recollections. Nothing unusual was surmised until the following June, when, becoming alarmed, she consulted her medical attendant, Mr. Clark, who diagnosed extra-uterine fœtation, the child lying between the uterus and epigastrium.

On July 3rd, Dr. Hewitt of Kingsland, from whom these particulars had been obtained, saw her. She was then suffering from violent vomiting and intense pain over the abdomen. A vaginal examination revealed nothing except that the relative position of the parts was abnormal; but it occasioned so much pain as to prevent a complete investigation. She obstinately refused to take chloroform. The previous diagnosis having been confirmed, an operation was suggested, but this she firmly rejected. A grain of opium three times a-day was ordered: soon afterwards it was increased two grains, and afforded great relief.

Towards the end of July, violent watery purging set in. This continued for two or three days, and then ceased. She became much reduced in size, and the severity of the symptoms abated. It was hoped that Nature might effect a cure. She went on in the same way, with occasional attacks of purging, until the 26th of August, when she suddenly felt intense pain; and afterwards became faint and collapsed. She was ordered a grain of morphia and brandy mixture. On the 27th she rallied, and as the pain was still excessive, the morphia was continued in grain doses, night and morning. Under this treatment she became easier, and continued so until the 30th of August. She then appeared to be sinking rapidly. Dr. Palfrey now saw her, and pointed out that there were two courses, either to allow the woman to remain as she was, which would be certain death, or to give her a last chance, slight as that must be, considering her condition, and to operate. The consent of her friends having been obtained, chloroform was cautiously administered. An incision was then made by Dr. Hewitt through the abdominal wall, a little to the left of the median line from the umbilicus to within two inches of the pubes. By this the cyst was exposed, which was found to be firmly adherent on all sides. An opening was made into it, when a quantity of fœtid gas escaped, together with some purulent matter. The fœtus was now extracted. It measured about ten inches in length, and was much decomposed. The integuments of the head had been wasted away, so as to allow the saggittal border of one of the parietal bones to protrude. The placenta had been altogether absorbed. It was then found that at the lower part of the cyst a communication existed with the rectum, too high to have been ascertained by any digital exploration of the latter. It was not considered advisable to attempt the removal of the cyst, which was returned in such a manner as to prevent any risk of strangulation of the bowel. The wound in the adominal wall was closed with sutures, and the woman replaced in bed.

Brandy was administered, but she never rallied, and died within an hour after the operation. No *post-mortem* was allowed.

A CASE OF

ACUTE SYMMETRICAL CARCINOMA.

UNDER THE CARE OF DR. FRASER.

THE following case is recorded from the notes taken by Mr. A. Le
Rossignol.   It is an interesting example of a very rare form of
disease.

The patient, a servant-girl, aged 20, was admitted on October 3rd,
1865, with a swelling in front of the sternum, induration of both
breasts, and a large hard mass in the lower part of the abdomen.
She was of dark complexion, fairly nourished, but of hectic aspect.
Her illness had commenced about six weeks before her admission.
The swelling on the sternum was the first perceived, then followed
pain in the abdomen, and soon afterwards swelling of the breasts.

Whilst in the Hospital the symptoms very rapidly increased ;
ascites came on, there were signs of pneumonia, and on October 21st
the patient died.   The whole course of her illness had thus extended
over not more than two months.

The following description applies to her condition about ten days
before her death.   She was then exceedingly pale, emaciated, and
feeble.   Her abdomen was distended with ascitic fluid, but large
growths could be felt deeply placed in the pelvis.   There was a firm
swelling in front of the sternum, as large as a child's fist, and firmly
attached to the bone.   The two mammæ were exactly alike, enlarged
and indurated in all parts, and of the shape which might have been
produced by moulding in a shallow basin.   They were not so hard as
true scirrhus, but still very firm.   The nipples were fixed, but not
materially retracted.   The glands were movable on the chest.   She

had had much pain in the breasts. There was no inflammation about either. In addition to these tumours, almost all the lymphatic glands in her body were enlarged. Everywhere their enlargements presented the same features—smooth, hard, movable kernels, without any adjacent inflammation. The sub-maxillary, cervical, axillary and inguinal, were thus affected, varying in size from beans to chestnuts. The base of the left lung was now dull on percussion.

The *post-mortem* examination confirmed the diagnosis of acute general cancer. The following are Mr Le Rossignol's notes respecting it :—

Body emaciated, legs œdematous, abdomen distended with fluid, mammary glands uniformly hardened, the left weighing six ounces and a-half, and the right six ounces. On section they presented a hard, white, translucent structure, involving the whole of the gland. On opening the thorax, a quantity of serous fluid escaped. The right lung was adherent to the parietes at the lower and posterior part. An incision being made, it was found congested posteriorly ; weight, one pound.

The left lung weighed fourteen ounces, and presented the appearance of pneumonic solidification, except at its anterior part. The heart weighed seven ounces. Several nodules of encephaloid cancer were present at the apex, and extended from thence along the wall of the right ventricle. A few deposits of a similar nature were found in the other parts of the heart. The liver, normal in size, had numerous deposits of encephaloid cancer. The kidneys were much larger than usual, and were masses of cancer. The mesenteric glands, the appendicæ epiploicæ, and the omentum were infiltrated with the same morbid material. Both ovaries were cancerous, and much larger than normal, being about the size of large kidneys. The sub-maxillary, sub-lingual, and other glands were indurated, and resembled the mammary glands in their peculiarities of structure.

Dr. Andrew Clark made a careful microscopic examination of the different deposits, and found them to consist of the cell elements of rapidly-growing cancer.

OBSERVATIONS ON THE RESULTS WHICH FOLLOW

THE SECTION OF NERVE-TRUNKS,

AS OBSERVED IN SURGICAL PRACTICE.

By JONATHAN HUTCHINSON, F.R.C.S.

THE not infrequent cases in which, in wounds of the forearm, one or other of the chief nerves are cut across, supply us with opportunities for observing the results which follow, as regards the the nutrition of the part and the maintenance of animal heat. I was myself scarcely prepared to expect that these results would be so definite, and, in some respects so curious, and believing that to many others they may also have a degree of novelty, I am induced to group together the following cases.

From such definite and simple facts—experiments as it were tried for us in the human subject—we seem to obtain information which ought to be allowed its due weight in explaining the phenomema of other much more complicated conditions of disease or sequences of injury. It is quite possible that not a few ill-understood local maladies—some forms of senile gangrene and many skin-diseases—may in future be proved to depend rather upon pathological changes in nerve-trunks than upon defects in blood-supply or morbid states of the fluids.

CASE I.—*Severe injury to the hand necessitating amputation of all, excepting the forefinger and thumb.—Section of the median nerve to the forefinger.—State of the nutrition of the finger two years afterwards.—Ten degrees of difference of temperature between it and*

X

the adjacent thumb.—History that inflammation of the finger had been an immediate consequence of the injury.

George K. S., aged 48, was admitted in December, 1862, in consequence of a recent accident, but the chief interest of his case belongs to a former injury. Two years before, Mr. Luke had amputated the little, ring, and middle fingers of his right hand. The injury had been caused by a circular saw, which had passed deeply in the palm on a level with the annular ligament, almost to the metacarpal bone of the thumb. The metacarpal bones of the three fingers mentioned were all removed at their carpal joints.

When he came before me in the out-patient's room for another injury, I congratulated him on having saved a useful finger and thumb. He replied that the fore-finger was of no use to him, inasmuch as he could not feel in it. He " could put it in the fire without feeling." I then noticed that its skin, below the second joint especially, looked too smooth and shiny, and on touching it found that it was much colder than the thumb. He complained very much of its aching and coldness. It had never become inflamed of late. The small muscles on the outer side of the thumb were wasted, but its adductor and the abductor of the index-finger were in good case. The parts were soundly healed, and the scar across the palm would not have been noticed without looking for ; it was, however, very deeply attached. The long flexor tendons were free, and he could bend the thumb well, and the finger to a moderate extent. On careful trials with the thermometer, I found the temperature of the pulp of the finger ten degrees lower than that of the thumb. This observation I confirmed by repeated trials (76° and 86°). With regard to the influence upon the nutrition of the finger soon after the accident, the man told me that he was long under care for " swelling and blistering of the whole finger." The thumb did not inflame.

On careful examination of sensation, I found that he could feel on the back of the finger up to, and a little beyond, the joint between first and second phalanx (radial nerve). In all other parts he had no feeling whatever.

Case II.—*Dvision of the ulnar nerve just above the elbow-joint ; Complete and permanent anæsthesia of the integument supplied by*

it.—Inflammation of part of the hand ending in resolution— Painless ungual whitlow of little finger with exfoliation of the skin and nail.—Perfect reproduction of the nail.—Contraction of three fingers (unexplained). Particulars of the state of the arm as to nutrition, animal heat, &c., twenty months after the accident.

For an opportunity of examining the case recorded in the following notes I was indebted to the kindness of Dr. Powell, at that time the Resident Medical Officer of the Hospital.

Rose M. a rather delicate girl, aged 14, was brought to me on the 28th of May, 1863.

In October, 1861 (twenty months ago), she sustained a very severe lacerated cut across the back of her right elbow by pushing it backwards through a pane of glass. The cut was very deep, and a part of the skin was taken quite away. She was admitted into the London Hospital under Mr. Critchett's care. It was three months before the wound was perfectly closed. With regard to immediate symptoms, she describes most accurately the parts which " were quite numb from the very minute she did it "—they are those supplied by the ulnar nerve. She states also that there was great swelling of the back of the hand, and that an abcess was feared, but it went away. She had great pain in the middle and ring fingers. There does not appear to have been any reason to suspect injury to the joint itself.

Present condition.—There is a large supple scar, just above the back of the elbow-joint. The whole arm is thinner than the other, the difference being most marked in the lower half of forearm. The hand is very much thinner, and, about the little finger, the muscles are wholly wasted. The metacarpal bone of the forefinger is left bare of muscle. The middle, ring, and little fingers are curved into the palm, the ring finger more than the middle one and the little finger most of all. She cannot straighten them, nor can they by force be bent back into a perfectly straight position. The attempt to do so gives her no pain, but she says it " drags something at her elbow." This flexion of the fingers is not due to paralysis of the extensor, for all the tendons of this muscle start up when she tries to extend them, and the first phalanges are bent back on the metacarpal bones but the other joints remain much curved. The triceps is much

x 2

wasted and its tendon has probably been partly cut through in the inner side. The spot where the ulnar nerve has been cut is easily felt. It is a little above the internal condyle. There is a separation of the cut ends for the space of about a quarter of an inch. Both ends are somewhat bulbous, but the lower much the more so, being enlarged to three times the natural size of the nerve. Pressure on the swollen ends does not cause much pain but she complains of "pins and needles" if either of them are much pressed, more especially if it is the upper one.

Temperature, sensation, and nutrition.—I could not distinguish any positive difference of heat in the parts supplied by the ulnar nerve in the two forearms and hands. With the thermometer applied between the little and ring fingers, it appeared that there was about a degree minus on the paralyzed side, but this observation was not very positive. There was not the slightest sensation in the little finger or ulnar side of ring finger, nor in the integment of the ulnar border of the hand. Sensation was defective, but not wholly absent in the palmar and dorsal aspects of the hand, over the metacarpal bones of the ring and little fingers, and also along the ulnar border of lower third of forearm. The integument of the affected fingers looked a little redder than that of the opposite hand, but presented no other peculiarity. The end of the little finger looked smaller than the other, and its nail was not more than half the size of that of the other hand. She told me in explanation of this, that some two months after the accident, the nail of this finger came off, together with the skin "like the end of a glove." She pulled it off one morning, and a new nail afterwards formed. The whole progress of the whitlow had been entirely without pain. I must ask attention to the fact that the new nail, thus formed in a part wholly deprived of nerve-influence (at least of cerebro-spinal) was perfect in form, although not of normal size. The girl also stated that in consequence of having no feeling in the little finger, she had several times burnt it, and that the sores had always healed well.

The day on which I tested the temperature was very warm. Both the girl and her mother assured me that in winter the paralyzed parts were usually much colder than the others.

I do not at present know how to explain the flexion of the fingers into the palm which so commonly follows section of the ulnar nerve.

In most of my cases the tendons of the forearm have been injured in the accident, and to their injury I have been inclined to attribute the contraction. Here, however, we have a case in which the nerve was cut, *secundum artem,* and without injury to any other structure, and in which the contraction was most marked. It is interesting also to note that it did not exist at first, but had, according to the patient's statement, gradually come on and increased during the last six months. She considered that it was still increasing.

CASE III.—*Section of ulnar and median nerves of the right forearm. —Ulceration of the paralyzed fingers.—Contraction of the fingers.*

Mrs. S., aged 30, one day, in the end of August, 1864, thrust her right hand through a pane of glass, and inflicted a very severe laceration of the wrist. She was at once admitted under my care at the London Hospital, where both ends of the ulnar artery were tied. She was insensible for some hours, owing to the loss of blood. I did not see her myself till the next day, when, in testing her sensation, I found that she had entirely lost feeling in the parts supplied by the ulnar and median nerves. The hand was kept enveloped in cotton-wool and the wrist well flexed on the forearm. I regret much that I have kept no notes as to the variations of temperature at this time. She left the Hospital in about a fortnight, at her own wish, the wound being in a healthy state, but not nearly healed.

Soon after she left, the little finger inflamed (without pain) and ulcerated at its tip and ulnar side. At a later period she had much pain in the ring finger, but still none in the little finger.

January 1st, 1865—(four months after the accident). Her hand is in the condition represented in the sketch. All the fingers and the thumb also are bent towards the palm, and she cannot straighten them. The hand everywhere looks thin and skinny, owing to the atrophy of the lesser muscles. This wasting is especially to be noticed in the ulnar border of the hand. The nail of the little finger is wanting, and an ulcer occupies its place. A second superficial ulcer is seen on the border of the hand, over the metacarpal bone of the little finger. The skin of all the fingers looks glossy and smooth, the wrinkles, &c., being wanting, although the fingers are thin. The nails are stumpy and broken, and uneven on their surfaces. The fingers are more deeply coloured than those of the other hand.

On pressure, their colour is easily removed and returns slowly. The fingers are to the touch much colder than those of the other hand. The scar two inches above the wrist is quite sound. The trunk of the ulnar nerve, behind the inner condyle, is easily felt in each arm. It is decidedly smaller in the injured arm than in the other. Slight pressure gives more annoyance on the right (injured), than on the left side. Letting the nerve roll under one's finger, she described as painful at the spot touched on the right side, and as causing no sensation on the other. I now pressed the finger very firmly on each nerve-trunk, and asked her what she felt. "I felt nothing in the right side, but, on the left, the little finger is numb and aches." This was repeated several times with like results. She never felt any pain below the part pressed upon on the injured side, and firm pressure did not give her more pain at the part itself, than did a light touch. The following are my notes as to temperature:—

Front of wrist (right)	.. ..	89°
,, (left)	.. ..	90°
Back of middle finger (right)	.. .. ..	72°
,, (left)	.. .. ..	88°
Cleft between little and ring fingers (right)	..	89°
,, ,, (left)	..	93°
Cleft between middle and ring fingers (right)		88°
,, ,,	.. (left) ..	94°

I also made a memorandum of the following points:—

"She says that 'her hand never gets hot.' It never feels cold subjectively. Sometimes she has cramp in it, sometimes pins and needles; both these sensations being chiefly felt in the palm. On the front of the hand and fingers she cannot feel anywhere, excepting in the radial border of the thumb, and a little in front of it. All the fingers are absolutely without sensation. On the back of the hand she has no sensation in the ulnar border, nor in the little or ring fingers. The proximal inch of the middle finger has sensation, and the whole of the fore-finger and thumb, to their nails, the sensation being however, less acute towards their ends. Behind the wrist she has sensation only in the radial half of the surface."

CASE IV.—*Section of the ulnar and median nerve of the right hand.*

—That of the median not quite complete.—Paralysis still existing four months after the injury.—Still in statu quo twenty-two months after the injury.—Much pain in the injured limb.—Reflex pain in the other hand.

Caroline P. aged 15, of feeble circulation. On the 10th of November, 1864, she fell and thrust her hand through a pane of glass. There was very profuse bleeding, which lasted for two hours. She was taken to the London Hospital, where her wound was dressed, and the ulnar artery secured. All the parts of the hand supplied by the ulnar and median nerves were paralyzed. I did not see her until January 23rd, 1865 (fourteen weeks after the accident), when the following notes were taken.

" Just above the right wrist, is a large thick scar, crossing from the ulna to the middle of the forearm. It is soundly healed. She tells me that it was quite healed within three weeks of the injury. The fingers are very slightly flexed, and she can bend and straighten them to a certain extent. The flexor tendons adhere to the scar, and the latter is dragged on, when they are moved. The hand is flabby, red, and mottled. The metacarpal bones of the thumb and little finger are rendered visible by the wasting of the muscles which clothe them. The pulps of the finger-ends are soft and not nearly so thick as those of the other hand.

On the parts supplied by the ulnar nerve, the loss of sensation is absolute, and it is also very nearly so in those supplied by the median. In the palm of the hand, however, she can just perceive irritation. She says that it causes a little tingling.

Back of hand.—On the thumb she feels easily up to the nail. On the forefinger she feels up to the joint between the first and the second phalanx, but not in the least beyond it; and on the middle finger up to the same joint, but not acutely enough to be able to tell which finger is touched. Ring finger, on the back and radial border, as far as the same joint, but not on the ulnar border. Over the wrist and hand itself, she feels well on the radial half, and not at all on the ulnar border. The skin between these parts enjoys imperfect sensation, which diminishes gradually as we approach the ulnar border.

Palm of hand.—Thinks she feels slightly up to the very tips of the fingers when pricked deeply, not at all on light touching. Over the

radial two-thirds of the palm, also, she feels when deep pressure is made, and not in the least on light pricking.   In front of the forefinger, she also feels pricking, but not unless it is made forcibly. On the middle finger she does not feel the deepest pricking.

Subjective sensations.—She complains that the fingers often burn very much, and that " the ends swell up at night," and often keep her awake.   She dreams much, and often wakes and finds the hand so hot that she cannot bear it.   She says that the nails often turn quite blue, and that " water (perspiration) often runs out of the end of the middle-finger."   Often the thumb, and across the knuckles, ache with cold.   The little finger never either aches or feels hot.

When she came into my room (a cold frosty morning), both hands were very cold and mottled and I could distinguish no difference in temperature.   After she had sat in the warm room (63°) for half-an-hour, I made the following observations with the thermometer.

Cleft between little and ring fingers, left 83° ; right (paralyzed) 64°.

This remarkable difference I verified by two careful trials, and there was not the least room for mistake.

Both hands were now put into water at 108° ;   Whilst in it the back of left hand not covered, by water, registered 76° ;   The back of the right 68°.   Both hands in water at 118°, and the backs of hands not covered, registered ; right 78°; left 88°.

I pressed very firmly on the right ulnar nerve behind the internal condyle and she felt " pins and needles" in the ulnar border of forearm, but not lower than the wrist, not in the least in the little finger. It did not seem to cause pain.   The ulnar nerve on this side is not more than half the size of that of the other arm.

The loss of temperature occurs in the whole forearm, not only in those parts of the hand below the section of the nerves.   Thus we notice the skin to be mottled, and a little livid, and find the ten degrees of difference in its heat in the two arms.   Back of right arm a little below elbow 71°; left 81°.   The right arm is very much thinner than the other, and the integument in the state of *cutis anserina.*

About a quarter of an hour after both had been in warm water, the difference was only 4° ; the right being 73°, the left 77°.   Thus the left was much cooler than it had been during the first stage of reaction after coming from the cold into a warm room.

The effect of warm water is at first to make the paralyzed hand livid, and the other of a bright red, but on a second trial, and with water of higher temperature the paralyzed hand became deeply coloured of a bright salmon tint or like the spots on a plaice. Wherever pressure had been made red spots appeared, which were abruptly defined. It would have been easy to write letters on the skin as we can do in urticarious patients.

August 14th, 1866.—She has very little use of the hand. Its general condition being much as it was at date of last note. The hand is very much thinner than the other. Girth round knuckles three-quarters of an inch less than the other. The scar is quite soft and loose. There is very little evidence of repair of the nerves. The ulnar nerve appears to be still absolutely paralyzed, and she has still but very indistinct sensation in the parts supplied by the median. Thus a pin may be thrust into the pulp of the middle finger, and she does not feel it till it is quite through the skin. Even at that depth she cannot tell which finger is pricked. The nails are all quite perfect. The hand is a little mottled. The little finger especially so.

Temperature of room 68°. The hands had been placed side by side on a table for about ten minutes before the thermometer was used.

Cleft between little finger and ring finger, right hand ... 80°
,, ,, ,, left ,, ... 90°
,, fore ,, middle ,, right ,, ... 89°
,, ,, ,, left ,, ... 94°

It is curious that she now avers, that the tracts of skin supplied by the radial nerve in the injured limb, are much less sensitive than natural. This appeared quite definite. Whenever we touched any part of the radial territory, she said she could "feel a little, but not much." That the whole of the forearm is cooler, as high as the elbow, than the other, there can be no doubt. After both had been equally exposed for some minutes the right forearm, in the middle of the dorsal aspect, registered 83°. The left 86°. She says that the injured forearm often aches very much, more especially in rainy or cold weather. She is then obliged to wrap it up in flannel, because it becomes so cold and discoloured. The nails, she says, get quite black. When the pain in the arm is very bad, it is a confused

aching in the whole of the upper extremity.   When at the worst, she says that it makes the other hand ache, and makes it weak, so that she cannot use it.   As regards the use of the hand, she can scarcely do anything with it.   She can just manage to hold a pen or pencil by pressing it deeply into the cleft between the thumb and fore-finger; if it gets nearer to the ends of the thumb or finger, she cannot feel its presence, and it drops from her hold.

So long a period as twenty-one months having passed, it is, per-haps, scarcely to be hoped that the nerves implicated will ever be restored.

CASE V.—SYNOPSIS—*Division of the ulnar nerve and vessels and of the median nerve.—Anæsthesia of the parts supplied.—Inflammation of the tips of three fingers, unattended by sensation.—Diminution of animal heat in all the parts paralyzed.—Increase of heat during inflammation, but still not up to the normal standard.*

A healthy girl, aged 22, cut the ulnar side of her right forearm very deeply on a broken window.   The wound was at the upper part of the lower third, and passed across the ulnar vessels and nerve deeply into the mid-structure, probably dividing the median nerve. It bled very freely indeed.   She was taken to the Hospital where the hæmorrhage was arrested, and the wound dressed.

She came under my notice three weeks afterwards; the wound being then just healed.   The scar was then puckered in.   She stated, as regards pain, that she had had very little in the wound, but much aching in the palm.

The hand of the wounded arm looked a little thinner and a little paler than the other, but there was no other difference to the eye. All the fingers were kept bent slightly in the palm, and she was unable to straighten them, owing, as she believed, to the effort to extend dragging on the scar.   In the attempt to extend, the scar was moved.   She was able to flex the fingers fairly, but could not contract her palm, or bring the thumb into apposition with any of the fingers.   The muscular mass between the thumb and fore-finger was thin and flabby.   The beat of the ulnar artery could be de-tected below the scar.

Sensation.—Immediately below the scar she could feel the prick of a pin, but not acutely ; an inch or two lower, she could scarcely

feel it. To the radial side, and at all parts above the scar, she could feel well. At the level of the wrist, in front, all sensation was lost, excepting over the ball of the thumb, where it was retained in an imperfect degree. The little finger had no sensation on either side, nor had the ring, middle, or fore-fingers. There was no sensation at the backs of the little, ring, and middle fingers; very little at the back of the fore-finger, but somewhat more behind the thumb. Over the back of the hand, sensation was imperfect, being more so as the ulnar border was approached. The extremity of her ring-finger was inflamed, and presented an open sore, on the face of which, however, the prick of a pin was not felt in the least. The ends of the middle and little fingers were also inflamed. She had had no pain during the formation of these whitlows, but a continued aching in the palm of the hand. The palm, it should be observed, was not in the least swollen, nor was it tender to pressure.

Nutrition.—About ten days after the accident, the tips of the little, ring, and middle fingers inflamed. In each the exact tip was affected, and serum was effused beneath the skin over the entire extremity ; the finger-ends were slightly swollen, reddened, and, in the case of the ring-finger somewhat tense. No pain was felt. The effusion in the little finger was absorbed. The skin at the end of the ring-finger died over a space of the size of a sixpence, and there is now an open sore at that part. On the middle finger the subcutaneous bulla still exists. The cuticle is elevated by effused serum (subcuticular whitlow) and there is an areola of reddened skin about it.

Temperature.—On cursory examination, no difference from normal heat would have been observed in the affected hand. (The weather being sultry.) On comparison with the other hand, a difference is, however, very perceptible, the nails of the affected hand feel indeed, slightly cold. By the thermometer, a difference of about nine degrees is shown between corresponding parts of the two hands. On the finger most inflamed, the heat is greater than on the others, but still does not rise quite to that of the same finger of the other hand.

| Right fore-finger (paralyzed) | side | 79° | front | 78° |
| Left   ,,   (sound) | .. .. | 90° | ,, | 87° |

Right little finger (paralyzed) radial side .. 80°   ulnar side 79°
Left   „   (sound)   .. .. 89°   „   *89°
Right ring finger (paralyzed, but inflamed) front   .. 89°
Left   „   (sound)   .. .. 91°
Right middle finger (paralyzed, but slightly inflamed)   .. 87½°
Left   „   (sound)   .. .. 91°

CASE VI.—The following case very closely resembles, in most points, the preceding one. In both, a great loss in temperature was the most marked feature. In both, the influence of the nervous force, in preserving a normal state of nutrition, was illustrated by the occurrence of whitlows at the ends of the fingers from which it had been cut off. In the former case, three fingers were so affected ; in the latter, only one. In all, the position of the inflamed part was precisely the same—*the very end of the finger*. It is an interesting fact, in the present case, that there was very decided loss of temperature in the integument, even above the position of the wound. The details given will, however, tell their own story.

ANALYSIS.—*Section of the ulnar nerve, with, probably, wound of the median also.—State of the hand three months afterwards.—Loss of temperature in the whole hand, and also in the fore-arm above the scar.—Dilated and atonic condition of capillaries.—Whitlow at the end of the ring-finger—Atrophy of the muscles supplied by the ulnar nerve.—Recovery of a slight degree of sensation in the parts.*

Emma R., aged 15, on October 19, thrust her right hand through a pane of glass, and received a deep cut on the inner part of the fore-arm, about an inch above the wrist-joint. The radial end of the incision passed as far as the middle line of the fore-arm, but possibly it passed deeply still further. It crossed the ulnar vessels and nerve. There was very free bleeding, which was stopped by compress and tight bandage. She was taken to the London Hospital an hour afterwards. No further bleeding occurred. The wound healed slowly, and with suppuration. She was discharged five weeks after her admission.

Examination.—February 1st, 1863, rather more than three months after the accident. She is in good health, but has not been able to

* Two sides exactly alike.

make any use of her hand. The hand is chilly and bluish-red, like that of a person suffering from chilblains; the capillaries fill slowly when emptied by pressure; all the finger-nails are somewhat clubbed, and decidedly more curved than those of the other hand. The scar has been quite sound for six weeks, and is free from tenderness. It moves when the fingers are straightened, the tendons being adherent to it. Sensation is good above the scar, and exceedingly imperfect below it—over the ulnar side of the hand, the little and ring fingers. No discoverable difference between the two sides of the ring-finger. The middle and fore fingers have only imperfect sensation; in the thumb it is tolerably good. It appears to improve gradually as we go from the little finger to the thumb. Even over the little finger she has a slight degree of sensation, and can tell sometimes when lightly pricked. All the fingers are bent forward to the palm, but do not touch it. To straighten them causes pain at the scar.

The muscles clothing the metacarpal bone of the thumb are much wasted. The carpo-metacarpal joint is too visible, and the outline of the metacarpal bone is exposed. On the back there is a remarkable hollow between the thumb and fore-finger, and the metacarpal bone of the latter is immediately under the skin, the abductor indicis being quite wasted.

When told to draw her thumb across the palm, to make it and the little finger meet, she bends the thumb by the long flexor, and is quite unable to adduct it whilst extended. She cannot bring the thumb and the little finger together by any effort, partly because she cannot move the little finger at all. The structures in the palm are a little thickened, and she has slight tenderness on pressure there. She says that she has not had much annoyance from sensation of cold or aching in the hand, but she is quite aware that it is colder than the other; she has also noticed that when the hand is put into hot water she does not feel the heat well.

At the very end of her ring-finger (injured hand) is a small whitlow; it looks as if a few drops of pus had been effused beneath the skin, and were now nearly absorbed. The skin over it is dry and horny; there is a little red areola around it. She has had no pain in it, and it is not tender. It began to form nine days ago.

The following is a statement of the temperature, as determined by

the thermometer applied to different parts. The experiments were made after the girl had sat in a warm room for half-an-hour, with the two hands equally exposed :—

	Left.	Right.	Difference.
Ulnar borders of the two hands	66°	61°	5°
Between little and ring fingers (in the cleft)	65°	59°	6°
Between thumb and fore finger (in the cleft)	66½°	62°	4½°
Between fore and middle fingers (in cleft)	65°	60°	5°
Pulp of thumb-end	62½°	60½°	2°
Ball of thumb (palmar aspect)	65°	61°	4°
Front of fore-arm four inches above wrist (three above the scar)	78°	74°	4°

CASE VII.—*Section of ulnar nerve, and of part of median nerve.—No return of sensation two months later.—Contraction of fingers.—Evidence as to the distribution of the radial nerve on the back of the hand.*

Edwin N., aged 15, had a deep cut an inch above the wrist-joint across the course of the ulnar vessels and nerve. No artery was tied, but it bled at first very much. It was about May the 11th that he had the accident, by thrusting his hand through a pane of glass.

I saw him a month later (the wound then scarcely healed), and ascertained that he had at first all the symptoms of section of the ulnar nerve, and of notching of the ulnar edge of the median nerve also.

July 20*th.* He has lost sensation in the little, ring, and middle fingers, both sides of each. Palmar aspect of hand, no sensation till we cross the space between metacarpal bones of middle and index-finger. On the outer side of hand on ulnar border *i.e* outside the metacarpal bone of little finger he can feel fairly.

He can use his thumb and index, but the middle, ring, and little fingers are all contracted on the palm, and these he cannot use. He cannot bring the thumb across the palm towards the little finger. When he tries to do so, he merely flexes the thumb. He has no pain. The weather is hot, and his paralyzed fingers are warm, nearly as much so as the others.

The scar is dragged upwards when he tries by aid of the other

hand, to extend the contracted fingers. On the back of the hand he has good sensation on the hand itself, and on the whole of the thumb and index-finger, but on the little, ring, and middle fingers sensation ends gradually between the knuckle and the next joint.

The paralyzed fingers are red and the capillaries when emptied by pressure refill slowly. They have never inflamed.

It gives him no pain to extend forcibly the contracted fingers. The middle finger is more contracted than the others.

COMMENTS ON THE SERIES.

Anatomical observations.—The ulnar and median nerves are from their position those most likely to be divided in injuries to the fore-arm, and the ulnar is much more frequently injured than the median. The ulnar is also usually cut completely through, whereas the median is often only notched on its ulnar side, and not wholly divided.

I have never had an opportunity of examining a case in which the radial had been divided alone, and in almost all my cases this nerve remained intact. [1] They, therefore, afford us good opportuni-ties for determining how much of the integument of the fingers is supplied by this nerve. My conclusions on this point differ in toto from those of such anatomists as affirm that the radial nerve supplies the whole of the dorsal aspect of the thumb, fore and middle fingers, and the radial side of the ring finger. It is quite certain that those are right who, with Swan, affirm that it does not pass nearly to the ends of the fingers. On the thumb it passes as high as the root of the nail; on the fore finger, as high as the middle of the second phalanx; on the middle finger, and on the ring finger not higher than the first phalangeal joint. The distal parts of these fingers are sup-plied behind as well as in front by twigs from the median which curve backwards, and encircle the fingers. When the median is cut these parts lose all sensation, and the border territory between that supplied by the median, and that by the radial, is also decidedly defi-cient in sensation, although not absolutely numb.

When the ulnar nerve is cut at the wrist, there is complete loss of sensation in the whole of the little finger, and in the ulnar side of the ring finger, both back and front. The ulnar border of the hand, and the skin overlying the metacarpal bone of the little finger, and part of the next one, are also involved in anæsthesia.

One of the most characteristic symptoms of paralysis of the ulnar nerve is a hollow between the fore-finger and thumb, especially to be noticed close to the metacarpal bone of the fore-finger, and due to the atrophy of the abductor indicis.* This hollow is seen at a glance. The muscles, which depend upon the ulnar nerve for their excitement, are all the short muscles of the little finger, the palmaris brevis, the inner part of the short muscles of the thumb, all the interossei, and the two internal lumbricales. Amongst the interossei is included the abductor which I have above mentioned.

Before we investigate the question as to the influence of the nerves on nutrition, we must answer any objectors who might incline to attribute the lost of heat, &c., which exists, to defects in blood-supply. This is easily done. It is quite true that, wherever the ulnar nerve is cut through above the wrist, the ulnar artery usually goes with it. Severe hæmorrhage attends the accident, and ligature of the two ends of the cut artery is generally required. This circumstance may interfere with the results for the short time, but not for long ; and there is not the least reason for believing that ligature of the ulnar artery, would have any *permanent* effect on the nutrition of the parts supplied. The inosculations are too free, and the

---

* My attention was first directed to this symptom some years ago by my colleague, Mr. Couper. It has been of great use to me several times since. I have repeatedly, by its aid, recognised paralysis of the ulnar nerve, in cases of which I had no previous knowledge. I believe that it is not very infrequent for paralysis of this one nerve to occur without any history of injury, and without any other symptom of cerebro-spinal mischief. At any rate, I have had several such cases under care. In these the mortor function fails before the sensory, although both are ultimately involved, and the wasting of the muscle mentioned may be very apparent before the patient is aware that he has lost sensation in any part. About two years ago, my friend, Mr. Colman, requested my opinion in the case of Mr. B., a gentleman, of middle age, and in robust health, but suffering from abnormal sensations in the fore-arm. A glance at his hand told me that his ulnar nerve was paralysed, and on examination I found that sensation in the little finger, &c., was almost wholly lost. A few months later I saw a similar case, and in neither could we trace the paralysis to any very definite cause.

An ingenious and distinguished author has referred this wasting of the muscles between the fore-finger and the thumb, after injury to the ulnar, to reflex disturbance of nutrition. It is, however, not reflex, but direct, since the muscles in question are supplied by the deep palmar branch from the ulnar trunk itself.

collateral circulation too easily established for such a result to be possible. We have plenty of facts as to the tying of the ulnar artery without injury to the nerve, and in none do any ill-consequences result. We may, therefore, feel quite certain that the symptoms met with a few weeks after the accident, or at longer periods, are due to the nerve, and not to the artery.

Physiological Results.—Next to the loss of sensation, respecting which we need say nothing, we have as the chief result of nerve section, a diminution of temperature. It is to be noted that none of my cases were accurately observed soon after the accident, most of them not until the wound was healed. Many conditions make trials of temperature at early periods after the injury liable to mislead, such, for instance, as the fact that the vessels as well as nerves are usually cut, that inflammation is in progress at the wound, and that the part is protected by dressings. Respecting the state of things some weeks afterwards, I find no exception to the assertion that there is always a remarkable loss of heat in the part which has lost sensation. The amount of comparative loss will vary with the external conditions, for it is a remarkable feature as regards the heat of paralyzed parts that it is so much at the mercy of external influences. All my patients agreed in the statement that in cold weather the anæsthetic fingers became very blue and cold, and in many I was able to demonstrate this fact. In the warmest temperature, however, their heat could never be raised up to that of adjacent, unparalyzed parts. Nor does even the existence of active inflammation raise the part to the normal standard, although it much increases it. In case V. there was ten degrees of difference between the little finger in the hand from which the nerve-supply had been cut off, and that of the other. The ring finger was paralyzed and inflamed, and its temperature was increased by inflammation, until it came within two degrees of that of the other hand, but still it did not quite reach it. In Case IV. we put the two hands into hot water (118°) and the result was that both hands gained in temperature about ten degrees, and that the difference between them remained as great as at first. It would appear, therefore, that while a paralyzed part can be cooled to almost any extent, it cannot be raised by artificial heat beyond a certain point, and that point much below the maximum of its uninjured counter part.

Y

In one case only it occurred* to me not to find much difference between the paralyzed and healthy parts. My general experience has been that a difference of from six to ten degrees will be apparent.†

To what are we to attribute this remarkable loss of power to sustain the normal temperature, and to guard against the depressing effects of external cold? To say that it is the result of mere disuse is unsatisfactory, for we find it just as marked where one finger is contrasted with the others on the same hand, as when the whole hand is affected. One of my cases (Case I.) is almost crucial in this respect, for the man had but a finger and thumb, and used neither of them, yet the finger deprived of nerve influence registered ten degrees lower temperature than the thumb which yet enjoyed it. To allege that it is due to " dilatation of the smaller arteries and consequent slowness of the circulation" is scarcely more satisfactory, since paralysis of the vaso-motor nerve, and consequent dilatation of the vessels, is well known to lead *to increase of temperature.* Yet it is quite certain that the capillary circulation is in some way greatly disturbed. If you chill the part it becomes not merely pale, but livid ; if you warm it, it becomes not of a bright, pink, flesh tint, but of a peculiar dull brick-red colour. The most plausible conjecture seems to be, not that the nerve-control over the vessels is at fault, but that the *vis a fronte* is itself much diminished.

One way in which this must be reduced would no doubt be by the atrophy of these parts of the skin which endow it as an organ of tactile sensibility. No doubt but that after a nerve of sensation has been long cut you will find the papillæ of the skin wasted and shrunken. The nerves themselves will also no longer maintain their own nutrition, and thus a much diminished demand for blood will result. I cannot but think it probable, however, that there is something more than this, and that the endowments of every single cell in a part no longer connected by nerves with the great centres, undergo an alteration.

* This was on a hot day ; the patient stated that in cold weather the fingers were very cold.

† Mr. Erichsen has recorded an interesting case in which, twenty-one weeks after section of the ulnar nerve, the fourth cleft was 9° less than the corresponding part of the other hand.—*Art and Science of Surgery*, p. 207.

If we may suppose that the cells of the part no longer possess the same energy of growth and nutrition, no longer attract the blood, take from it what is needed and transmit it forwards, then we can at one and the same time account for the loss of heat, the manifest slowness of the capillary circulation and the occasional changes n structure to which I must next advert. Whether such an hypothesis is admissible I must leave with physiologists to say. If it be we may perhaps be permitted to speak of paralysis of the *vis a fronte* of the circulation as the real cause of the loss of temperature after division of nerves.

Lesions of Nutrition.—It has been the subject of some debate whether the inflammations which often follow in paralyzed parts—as of the eye, in paralysis of the fifth; the formation of bedsores and the occurrence of cystitis, in paraplegia—are in direct or indirect connection with the nerve-lesion. It is said that the eye does not inflame if it be covered, and that the bedsores will not form if the patient be protected from pressure (water-bed). There can be no doubt that accidental influences have a large share in the production of the inflammation, which follow under the circumstances suggested. The state of nutrition which results from the section of nerves is one which *permits* rather than *causes* inflammations. That it may, however, now and then suffice to originate it without any accidental cause super-added, is, I think, highly probable. Some of the facts in my present series seem to strongly support this view. In five, out of the seven, cases, it is stated that the fingers involved in paralysis became inflamed soon after the accident. The kind of inflammation was so similar in all, and so remarkable in some, that it is impossible to believe that it was the result of accident. It is possible that a patient having the fingers wholly without sensation, might allow one of them to press too long against the table, bed, &c., and thus a sort of bedsore be produced. But, when we find the tips of four fingers inflaming at the same time, when we find that the parts attacked are never those most likely to be exposed to pressure, but always those at the greatest distance from the centres, it is impossible to entertain such an hypothesis. The kind of whitlow which forms in these cases is very peculiar. It involves the very tip of the finger, and usually the skin

and part of the subcutaneous tissues with which, perhaps, the nail is exfoliated. In other cases the inflammation recedes, and its products are dried up.*

Several of my cases give illustrations of the fact, that although paralyzed parts are liable to inflame, yet they are capable of good repair.† In one case, a perfect nail was reproduced. In no single instance did the tendency to inflammation persist for long.

Repair of nerve-trunks.—None of my cases lend any material support to the commonly-received doctrine that nerve-trunks, which have been cut, are rapidly repaired. I have followed several of the patients over long periods of time, and, as yet, there is no evidence of tendency to restoration. It is true, that in all, the wounds were open, and several very large, but, on the other hand, in most of them the healing was rapid. It may be, however, that yet longer periods are required. At a late meeting of the Pathological Society, Mr. Nunn brought forward a very interesting and important case, in which, after the lapse of several years, a nerve-trunk was ultimately repaired.

To certain other interesting features, in the cases I have recorded, I can but invite attention without discussing them in detail. Amongst these may be mentioned:—

1. The observation that the loss of temperature extends even to a considerable distance above the site of the nerve-lesion.

2. The subjective phenomena of nerve-section, *i.e.*, the aching during cold, burning pain when warm, diffused pain in the whole member (Case IV).

3. The contraction of paralyzed muscles, as seen in Case II.

4. Reflex pain, &c., in the opposite limb, Case IV., p. 310.

* The close resemblance between these inflammations and the early stages of some forms of senile gangrene, is most striking. I have recently had under care an old woman with senile gangrene of the ends of three fingers, in which at first the fingers looked just as I have seen them do after section of a nerve. I am strongly suspicious that many cases of senile gangrene begin from defective nerve-supply.

† I have twice operated on the eye in cases in which the fifth nerve was totally paralyzed, and in both the wound healed well.

CLINICAL AND PATHOLOGICAL FACTS

IN REFERENCE TO

INJURIES TO THE SPINAL COLUMN AND ITS CONTENTS.

THE following series comprises the more interesting examples of injury to the spinal column, which have been under observation during the last two or three years, with one of more remote date. It does not, by any means, include all the cases, but only those which seemed to illustrate important points, either as regards treatment, diagnosis, or physiological inference.

The cases of recovery have especially been collected, with the view of illustrating the important fact, that even in severe cases, with permanent local displacement, and with paraplegia lasting for some weeks, complete recovery may ensue. See Cases I., II., VIII., and XVII.

The fact that paralytic symptoms may increase, a few days after the injury, is illustrated in Cases II. and XI.

Many of the cases give important information as to the kind of displacement which is most common, and its usual effects upon the cord, and illustrate clearly the inapplicability of operative interference. In no single case has any operation (other than attempts at reduction by extension) been performed at this Hospital.

To the report of cases, is added a list of all the specimens in our museum, which illustrate these injuries. A majority of these have been obtained recently, and all such have been put up in jars which can be opened, so as to allow the preparation to be removed, and carefully inspected.* These can, on special application to the Curator, be examined by any surgeon who may wish it.

* This statement will explain the term "in open bottle," which occurs after the description of some of the specimens.

The occurrence of paralytic myosis, or inability on the part of the pupil to dilate, finds examples in several cases, whilst increased heat of the surface depending upon paralysis (partial) of the vaso-motor nerve, is also illustrated (paralytic pyrexia).

Fracture of the sternum, in connexion with a bend forwards, occurred in cases XIV. and XVI., and in connexion with a bend backwards, is illustrated by specimens described at pages 351, 348, &c.

Cases III. and XVI. afford information as the frequent and remarkable changes in temperature which occur in paralyzed limbs.

CASE I.—*Fracture of the spine in lower lumbar region, with displacement.—Paraplegia with paralysis of the sphincters.— Gradual improvement.—Recovery in four months.*

(Under the care of Mr. Adams.)

(*Reported by Mr. W. E. Ditchett.*)

On June 20th, W. Asher, a labourer in the London Docks, was brought to the Hospital, with the statement that he had fallen from a height of thirty-eight feet into a ship's hold, and struck against an iron plate. He was entirely insensible. There was a considerable prominence of the spine in the lumbar region. His right ankle was also much bruised. There was no priapism. The genitals were completely paralyzed as regards sensation. Retention of urine, and great flatulence.

June 21st.—He is now perfectly sensible. He cannot now move either of his legs. Urine clear, somewhat scanty. Complete paralysis of bladder and consequent retention of urine. He did not feel the introduction of a catheter until the point of the instrument touched the coat of the bladder, when he cried out with pain.

28th.—General health better; bowels somewhat constipated. He passes his motions quite involuntarily. Has perfect sensation along the fronts of thighs. Can draw up his left leg, and also the right, but with more difficulty. He says that his right ankle is very painful. Urine more copious, thick, and ammoniacal. Appetite good. Full diet.

July 2nd.—General health good; bowels are less confined, and he is not so troubled with flatus; fæces pass involuntarily; his urine is much increased in quantity; it is very thick and ammoniacal. Mr.

Adams orders his bladder to be washed out twice a week with tepid water.

29*th.*—Since July 2nd, the patient has been progressing favourably; his urine is much clearer. The first few times the injection was performed, he complained of much pain. This was, doubtless, owing to inflammation of the mucous lining of the bladder (from deposition of phosphates), for as the urine became clearer the pain has diminished,' and the operation is now quite painless. His bowels are regular; motions still involuntary. Slight orchitis on right side. He has perfect sensation along the fronts of his thighs and legs, in the hypogastric region, and in the parts supplied by the ilio-hypogastric nerve, and in the scrotum; has good sensation in the first and second toes, and very partial feeling in the others; has not the least feeling along the back and inner sides of the thighs. He experiences a desire to make water, but cannot pass it.

August 11*th.*—His appetite is very good, and he states, "that he is gaining flesh." During the last day or two he has sat up for a short time. He says "that when he sits up, he has very little pain in the back; but that if he tries to stand, his legs seem to give way under him." The paralysis has much diminished. All parts of his legs are now more or less sensitive; the greatest amount of feeling being along the front, and the least on the insides of the thighs. It is less perfect in the right that in the left leg. Bladder still paralyzed; urine much clearer, and less ammoniacal; motions regular, but involuntary. From the situation of the prominence in the spine, and from the fact that sensation is perfect in the parts supplied by the first five lumbar nerves, it is probable that the seat of fracture is about the fourth or fifth lumbar vertebra.

After the date of the last note, Asher continued to improve. He became able to walk, and left the Hospital " cured " on Oct. 11th.

CASE II.—*Fracture of the first lumbar vertebra, with slight displacement.—Incomplete paraplegia at first, becoming more complete two or three days afterwards.—Nearly complete paraplegia for a fortnight.—Gradual improvement.—Perfect recovery.*

(Under the care of Mr. Hutchinson.)

The following case is a valuable one on account of the perfect character of the recovery :—

Samuel Moore, aged 32, a carman, was admitted on January 14th. He had fallen thirty feet from a stack of wood upon some small stones. He told us that he had not lost his consciousness in the fall, nor been in any degree stunned. When he got to the ground he found his lower limbs useless; his expression was that " he did not know he had any legs at all." He was carried to the Hospital, and when he was got to bed, it was found that he could move the legs a little, and feel indistinctly in all parts. Mr. Grubb, the House-Surgeon on duty, found irregularity at the upper part of the lumbar spine, and gave a confident diagnosis of fracture. In the afternoon of this day, and during the following day, the man was able to pass his urine voluntarily.

The accident occurred on a Saturday, and during the Sunday he remained in much the same condition as when admitted; able to draw his lower extremities slowly up, and able to tell which toe was touched, though feeling very indistinctly.

On Monday, January 16th, his paralysis was much more marked. He could scarcely move the lower extremities, and had almost wholly lost sensation in them ; he could not pass his water, and when the catheter was used, he said that he could only just feel its introduction.

On the 17th his legs were yet more feeble ; and on the 18th he could not move them at all. He still retained slight sensation, and on tickling the soles of the feet, reflex movements were produced. He had no priapism. The sphincters, both of bladder and rectum, were completely paralyzed. He was now put on a water-bed.

From January 17th to 25th, the catheter was required, and used regularly twice a-day. As regards his general health, he did not ail much. The paralysis of the lower limbs remained much as before.

On the 28th it was noted that he could move his lower limbs slightly, and the right one rather better than the left. Temperature of right 80°, of left 83°.

From the date of last note he steadily improved, and by the time he had been in the Hospital seven weeks he was able, by the aid of crutches, to get up and down the ward. He was discharged as an out-patient on April 20th.

For two months after his dismissal he still used crutches. In July, however, he was able to lay them aside, and to resume work, at

first as a watchman, and soon afterwards at more active employment.

On August 16th, 1866 (twenty months after the accident), he attended, at my request, at my house for examination. He was now in perfect health, and in active employment; able, he said, to walk twenty miles a-day; his feet were warm, and very sensitive in all parts. I could not make out a single symptom having any reference to his injury. The spinous process of his first lumbar vertebra could be seen to project considerably.

CASE III.—*Fracture of first dorsal, and displacement forwards of last cervical, vertebra.—Complete paraplegia.—Paralytic myosis. Paralytic pyrexia.—Abdominal respiration.—Death on the 15th day.—Autopsy.*

(Under the care of Mr. Hutchinson.)

Thomas Green, aged 35, was admitted on July 5th, 1864, with all the symptoms of fracture of the spine in upper dorsal region. He had complete paraplegia. On the chest, sensation was retained on the right side at a somewhat lower level than on the left. Both pupils were fixed and quite unable to dilate; the left was smaller than the right. Ears, arms, hands, legs, and feet very hot; pulse 80, full and bounding; respiration almost wholly abdominal.

The above notes describe his state on admission. Four days later the following note was taken: "Upper extremities cool; pulse 68, soft and compressible; ears and face warmer than legs, but much cooler than they were two or three days ago. Sometimes one foot is observed to be quite hot and the other quite cool; they rapidly cool when left uncovered. On his back he has sensation to the lower angles of the scapulæ."

On July 17th, the note is: "His paralytic symptoms remain as at first; he takes his food well, and says that he feels well, were it not for the pain in his arms; he complains much that his arms feel as if they had been burnt, and sometimes he has twitchings in them. His bowels acted freely yesterday quite unconsciously."

After the last note his breathing became more embarrassed, and he died on the 20th. The catheter had been required throughout. The loss of sensation and of voluntary and reflex motion in lower extremities and trunk had been absolute throughout.

At the autopsy the body of the first dorsal vertebra was found fractured, and the upper part displaced slightly forwards. Posteriorly, but little displacement could be observed. The cord was completely crushed. There was no permanent compression of the cord since the bones had slipped back again into place when the violence ceased. The specimen is preserved (in open jar No. 47), and is described in Catalogue G. *b. b.* 12.

Case IV.—*Injury to the cervical portion of the spine by the fall of a weight on the neck.—Paraplegia.—Loss of sensation below level of nipples, except in isolated patches of skin.—Hyperæsthesia of skin above the level of the nipples as high as the shoulders, above this normal sensation.—Respiration carried on solely by the diaphragm.—Slight priapism.—Death in twenty-nine hours.—Post-mortem examination.—Displacement of the fifth cervical vertebra backwards on the sixth.—Slight evidence of injury externally, but on section, crushing of cord, with extravasation of blood.—Fourth vertebra also partially displaced from fifth.*

The details of this case have already been published. *See* p. 187, Vol. I., *London Hospital Reports.*

Case V.—*Fracture of the cervical portion of the spine from a fall on the head.—Loss of motion and sensation below, an inch from level of nipples.—Tendency to action of flexor muscles of fore-arms.—Respiration carried on solely by the diaphragm.—Sugar found in the urine.—Death on the fifth day.—Post-mortem examination.—Fracture of the sixth cervical vertebra.—Medulla spinalis much bruised.*

This case has already been published *in extenso. See* p. 190, Vol. I., *London Hospital Reports.*

Case VI.—*Fracture of the sixth dorsal vertebra, with slight concussion of the brain consequent on a fall from a height, flat on the back.—Admission nine days afterwards.—Complete paraplegia.—Hyperæsthesia of skin above paralyzed part.—Incontinence of fæces and urine.—Constant priapism and increased temperature of lower extremities.—Pyæmia.—Death on the twenty-ninth day.—Autopsy.—Fracture of the body of the sixth dorsal vertebra, the*

upper part displaced forwards:—Spinal cord completely crushed.—No permanent pressure on it.—Pyæmic deposits in many internal organs.

' This case has been published in a former volume. *See* p. 191, Vol. I., *London Hospital Reports.*

CASE VII.—*Fracture, with displacement and crushing of the cord in the cervical region.—Diaphragmatic breathing : priapism : slow full pulse. Complete paralysis of all parts below seat of injury. —Paralytic myosis.—Death on the third day.*

(Under the care of Mr. Hutchinson.)

Daniel H., aged 55, a dock-labourer, was admitted into the London Hospital on the 17th of September, 1863, with fracture of the spine in the cervical region.

He was stooping forward to relieve a fellow-workman, when the handle of a crane, flying round with great velocity, struck him on the side of his head, knocking him flat down. He was taken up, quite unable to move, but still sensible.

When admitted, he had wholly lost sensibility in all his limbs, and in the greater part of his trunk. His arms were raised to a level with his shoulders, and his fore-arms were flexed (by the biceps). On further examination in the ward, he was found to have priapism, to breathe almost entirely by the diaphragm, and to have no power of dilatation in his pupils. The pupils were rather small. His pulse was full, slow, but regular, 50.

September 18*th.*—He seems much the same. He has no sensibility whatever in his trunk or extremities, indicating that the injury to the spinal cord has been nearly as high as it could be without implicating the origin of the phrenic nerve.

He can feel around the neck, also over the region of the acromion process, clavicle and sternum (these parts being supplied by the descending branches of the superficial division of the cervical plexus). The cessation of sensibility on receding from these parts down the arm or chest is well marked He passes his urine and fæces involuntarily. A catheter is therefore used every six hours.

19*th.*—He still keeps the same position. He can hardly speak, and his breathing is very difficult, owing to spasm of the diaphragm.

He died about one o'clock the next morning, during a fit of

vomiting.   At a *post-mortem examination* he was found to have fracture of the bodies and laminæ of the fourth and fifth cervical vertebræ ; The cord had been crushed at the level of the fifth vertebra.   The bones had returned spontaneously almost to their normal position. The lungs were very extensively congested.

CASE VIII.—*Fracture of spine, with displacement in lumbar region. —Paralysis of lower extremities, bladder, and bowels.—Recovery in three months.—Power of walking regained, but certain parts of integument of feet and nates still quite without sensation.*

(Under the care of Mr. Hutchinson.)

T. Wilson, aged 33, was carried into the Hospital on the 20th of January, with his lower extremities paralyzed in consequence of a fall from a mast-head. He was able to walk out of the Hospital and return home on the 19th of the following April.

The facts of his case make it, I think, quite certain that he had sustained a fracture of the spine with displacement, indeed, at the date of his return home, although able to walk, he was still quite without sensation in certain parts.

When he fell from the mast, he was seated in a " mast-stool," which fell with him, the ropes having broken. He fell across a hurdle over some lumps of coal on the deck. When he recovered from the first " stunning " effect of the fall, he found that he could not move his lower extremities and experienced most severe pain in his back.   He was carried to the Hospital directly.   On examination, it was found that he had no sensation in the lower extremities below the knees, and but little below the hips. His scrotum and penis had entirely lost sensation. The spinous process of one vertebra (third lumbar) projected considerably, it was exactly an inch and a-half above a line drawn across the back level with the iliac crests.

During the first week that Wilson was in Hospital he required the regular use of the catheter, and had also complete retention of fæces.   Large masses of hardened fæces might be felt in the colon, but they caused him no inconvenience.   Within a week of his admission the paralytic symptoms began to improve, and the gain continued steadily afterwards..   He enjoyed good general health throughout.   Galvanism was employed for the relief of the constipation, and with apparent benefit.   I am sorry that I do not possess any note

as to when the catheter ceased to be required, nor any observations as to temperature of legs, &c.   He never had any degree of priapism. At first he could not feel the catheter when introduced, and even at the time of his discharge his urethra had regained but very little sensibility.

On the 19th of April, at his own request, he returned home. He had then for a fortnight been allowed to get about, and had daily improved in walking. He considered that he was quite recovered, but on careful examination, I found that the skin of certain parts (quite symmetrical) was still wholly without sensation.   The following note, taken at the time, describes his condition :—

Sensation, &c.—On the outer part of the right foot, I pressed the sharp points of the compasses till his foot shook, and he felt the · foot shake, but could not feel the pricks.   Over the buttocks, almost exactly over the great glutei, and including also the anal region, he is very numb, so much so, that when I pressed the points of the compasses very firmly, he never once felt the prick, only a dull sense of pressure. As he lay on his back the area of numbness was was almost exactly bounded by the folds between the buttocks and thighs.   On the thighs he could feel comparatively well.   At the margins of the anus he could scarcely feel at all.   The numb parts had the same extent on the two sides most exactly.   His scrotum was numb, but not so much so as his buttocks.   His penis was also very numb, but not quite without sensation.   On the abdomen and in the groins he felt well.   His buttocks were flat, and his lower extremities generally, flabby and thin.   I think his glutei were more wasted than his other muscles.   He could feel better in the soles of his feet than on their backs.   On the latter parts he could scarcely feel at all.   On the legs he could feel fairly : but much better on their inner aspects than elsewhere.   He could just feel when the catheter was passed, and better when it entered his bladder than in the other parts.

After his discharge I did not again see him, as he returned to his home in Scotland.

CASE IX.—*Concussion of brain with injury to spinal cord.—Incomplete paralysis of all the limbs with paralysis of the bladder.—Recovery in six weeks.—Much benefit from galvanism.*

<div align="center">(Under the care of Mr. Curling.)

(Reported from notes by Mr. Alfred Walker.)</div>

It may be questioned whether the following case ought to be put in our present series. The symptoms, however, look more like spinal than cerebral mischief, and there can probably be but little doubt that a partial displacement in the lower cervical region had occurred.

Bartholomew B., aged 45, was admitted on the 29th of December, 1864, having two days previously, while in a state of intoxication, fallen down two flights of stairs and struck his back violently. He was taken to bed, and was reported to have been quite insensible till his admission. Shortly after admission he recovered his senses, but was partially paralyzed in all his limbs, the lower extremities being most affected. About three pints of urine were drawn off.

January 1st.—He complained of the sensation of "pins and needles" in his arms and legs, and it gave him pain to move his head from side to side, though his neck was not painful on pressure. He was quite unable to stand, and could scarcely move in bed. No irregularity of the vertebræ could be detected.

5th.—He appeared relieved by a blister which was applied to the upper part of the spine, and could move his hands better.

10th.—The blister was repeated. His bowels only acted after a purgative, and his urine had to be drawn off regularly with a catheter, which at this date caused a good deal of irritation.

13th.—He could sit up, and even walk a few steps without assistance.

20th.—He began to have some power over his bladder.

31st.—It is noted that he no longer required the catheter, and that galvanism was ordered to be applied to the upper and lower limbs every other day.

February 7th.—Mr. Walker states that the patient had derived great benefit from the galvanism, and said that "his lower limbs felt warm for the first time since the accident."

14th.—He left for the Convalescent Asylum at Walton. He could walk easily about the ward, but still had some difficulty in

moving his arms, and especially his fingers. His fingers had, however, become much stronger, but he could still only move them slowly.

A month later he came up again, and had much improved, but still was not active with his fingers. He could walk for about three miles. A month later (April 18th) he walked from the Waterloo Bridge Station down to the Hospital quite well. He complained of numbness in his extremities, and he was still so slow with his fingers that he could hardly feed himself.

Ten days afterwards Mr. Walker went to see him at his own house. He could then walk four or five miles, could throw a quoit about twenty feet, and could lift a quarter of a hundred weight. He had perfect control over his bladder and his bowels were opened regularly. After the accident he had lost all sexual desire, but had now quite regained it.

CASE X.—*Fracture of vertebræ, with displacement in upper lumbar region.—Paralysis of motion and sensation in the lower extremities. —Retention of urine and fæces.—No priapism.—Recovery in six months.*

<div align="center">(Under the care of Mr. Adams.)</div>

<div align="center">(<i>Reported from Notes by Mr. Rees Llewellyn.</i>)</div>

Thomas I., aged 40, was admitted on the 28th of June, 1864. He had fallen a distance of about forty feet on to the ground. He said that he was not stunned at all, but found that he could not use his legs. There was considerable ecchymosis and swelling across the lumbar region, and the spinous process of the ninth dorsal vertebra appeared to have been broken off and depressed. He had lost sensation from the level of the crest of the ilium downwards on both sides : excepting in front of the patella, and over a small area at the upper part of the popliteal space. He could not lift up his legs, but it was noticed that when he tried to do so his sartorius and adductor muscles acted somewhat. When his feet were pricked, no reflex action followed. There was no priapism. His urine had to be drawn off, and his fæces passed involuntarily after a purge had been administered.

July 2nd.—His urine was ammoniacal and offensive.

6th.—It is noted that a little sensation was returning in the soles of his feet.

29th.—He complained of pain in his thighs " as if in the bone." He had had a rigor followed by a cold perspiration the day before.

August 20*th.*—He still had the pain in his thighs, and he also had frequent spasmodic action of the muscles.

September 12*th.*—His urine began to run away from him, his bladder having somewhat regained power.

October 16*th.*—He could not separate his thighs, but if they were separated he could draw them together again. He could flex both knees slightly and raise his feet from the bed. He could feel almost as well as ever.

November 2*nd.*—He passed his urine voluntarily for first time. Stated that he had lost all sexual desire until that morning.

December 2*nd.*—He was made an out-patient. He could then micturate easily and could walk very fairly with the aid of crutches.

As regards treatment, he was put on a water-bed till the 5th of October, when this was changed for a mattress and a water-pillow. A grain of calomel twice a-day was ordered, on the second day, but it was continued only for a few days. The cystitis was treated by syringing the bladder out with warm water, and by the administration of dilute nitric acid. Later on, quinine and iron were ordered. Galvanism also was resorted to.

CASE XI.—*Injury to the spine, followed on the second day by motor paraplegia, involving first the legs, and afterwards the arms also. Recovery in five months.—Benefit from the use of galvanism.*

(Under the care of Mr. Curling.)

(*Reported from detailed notes by Mr. F. E. Ryott.*)

In the following case there is no proof of fracture or displacement. The diagnosis, as to the nature of the injury or its local consequences, is sufficiently obscure :—

Patrick W., æt. 30, was admitted May 20th, 1854.

He was reported to have fallen on to his feet from a height of sixty feet, his back and head coming in contact with an iron funnel as he fell.

He seemed stunned by the fall, but answered questions, and complained of great pain in the nape of his neck. There was a small scalp wound in the occipital region; but upon the most careful

examination, no fracture, either of the skull or spine, could be detected, and he could move his arms and legs.

As he did not pass any water, a catheter was introduced in the evening.   During the night he annoyed the patients and nurse by tumbling out of bed, and lying on the floor.   He said he could not lie in bed.   He could not stand.   The next day he had almost entirely lost the power of moving his lower extremities, but the function of sensation was unimpaired.

May 29*th.*—His skin was very hot, and the paralysis had so much extended, that he could only move his arms by a " wriggling motion."   The lower limbs were quite helpless ; still the function of sensation was unimpaired.   He had much pain in the region of the bladder, and in the nape of the neck when he moved his head, and he could not sleep at night.

June 1*st.*—He was very thirsty and much weaker, his pulse was more feeble, and his countenance heavy.   His arms were almost completely paralyzed.   The passage of the catheter hurt him exceedingly.

6*th.*—He had had sleepless nights, and had been very much troubled with hiccup.   A number of aphthous spots appeared on his tongue and fauces, and his lower extremities were quite cold from the knees downwards.   His urine had dribbled away for a week past, and his penis was becoming excoriated.

At this time it was not expected that he would recover ; he was in such an exhausted condition, but on the 8th he was better.   He had had some sleep, and complained of being hungry.

10*th.*—He could again " wriggle his arms about."   The pain in the bladder was less, his countenance looked much brighter, but the hiccup was still troublesome.   His penis was in a very unsatisfactory condition, pulpy in parts, indurated in others, so that it was difficult to pass a catheter.   To remedy this the " bottle " was removed, and the urine allowed to dribble on to some sawdust, sprinkled with dilute sulphuric acid.   This removed the smell, but irritated his thighs.

21*st.*—Was better on the whole, but wandered at night, and had a bed-sore added to his other misfortunes.   A slough had come from the penis, and the surface underneath looked fairly healthy.

July 1*st.*—The passing of the catheter seemed to be such a

z

source of irritation that it was determined to discontinue its use. He still could not sleep at night, wandering at times, and eating very little.

30th.—He had so much improved, that he was ordered full diet.

August 13th.—He complained of pains in his legs and knees, His spirits were good, his face more cheerful, and his mind contented. He could push his legs down, after they had been drawn up for him, for the first time since the paralysis came on.

17th.—He could draw his legs up himself, and was allowed to sit up in a chair.

October 1st.—He has recovered the use of his arms, and the partial use of his legs, but he cannot walk.

On the 5th, he went out of the Hospital. He soon afterwards was admitted into another Hospital, where he was blistered, but with no good effect. Afterwards he became an in-patient of St. Bartholomew's, where he was galvanized twice a-week; from which he received the greatest possible benefit. Five months later " he presented himself, much to my astonishment," says Mr. Ryott, " at this Hospital in perfect health, able to walk well without a stick, and no defect of gait could be detected."

CASE XII.—*Partial displacement in the lower cervical region, followed by immediate paralysis of the right arm.—Imperfect recovery.—Injury probably to the nerve-roots rather than to the cord itself.*

(Under the care of Mr. Hutchinson.)

The following is a good instance of a partial displacement of vertebræ. The patient only came under care for the results of the injury some weeks after its occurrence :—

James G., aged 42, was admitted February 13th, 1866.

Five weeks ago, while carrying a sack of coals on his back, he fell down some stairs. He fell with his head jammed in a corner. After he fell he says he could not get up himself, and he was carried to bed. " He had no use whatever in his right arm, and no feeling in it." At the end of the week he tried to get up, but found that he could not do so. He could not even sit in a chair, he felt so weak. At the end of three weeks he could walk across the room, and from that time he has steadily improved. He can now walk well.

Present condition.—The left hand is cooler to the touch than the

right one is, this was evident to three different observers ; but we found afterwards that it had been exposed, while the other was covered.   There is decidedly a twist of the neck ; the spinous processes just above the seventh cervical vertebra, being bent towards the right side.   He cannot use the right hand, though he can lift the right arm.   He cannot grasp with the fingers.   He says that his sensation is as good in one hand as in the other, and we cannot make out any difference with the compasses.   Both seem defective. His complaint is, that he is weak from the elbow downwards, especially at the wrist and hand.   The right forearm, at its thickest part, measures eight and a-half inches.   The left measures fully nine inches.   He complains that, on the ulnar aspect of the left arm, he has a burning sensation.   The muscles, both of the upper and forearm, are decidedly a little more flabby than those of the left.   The capillary circulation in both hands is feeble, and the hands are mottled ; he exerts the left great pectoral muscle much better than he does the right one ; he cannot grasp with the right hand, nor use the knife with it ; he can grasp with the left hand almost as well as ever.   There is no difference of the pulse on the two sides, nor any real difference of temperature.

CASE XIII.—*Fracture of the spine in lower dorsal region with crushing of the spinal cord.—Paraplegia, with paralysis of bladder and intestines.—Recovery of the viscera, their sphincters still remaining paralyzed.—Paralysis of the right third nerve (unexplained).— Death in six weeks.—Post-mortem examination.—Fracture of last dorsal vertebra.—Inflammation of the bone where injured.*

(Under the care of Mr. Hutchinson.)

James Adams, aged 54, was admitted on the 14th of May, 1866.

He had fallen from a ship's-quarter into the dock, quite "flat on his back."   The bottom of the dock was level.

Half-past two P.M. (seven hours after admission).—He is in collapse, his pulse only just perceptible, his face pale, his lips dusky, his hands cool ; the lower part of the dorsal region appears to project, and is much swollen.   He is believed not to feel in the least in his feet.   He cannot move his legs at all.   There is no priapism.   He has not passed any water.

May 15*th*—His pulse is 120, his tongue white and furred.   His

right eyelid now droops considerably, and he cannot raise it, the pupil is widely dilated and fixed, and the eyeball is everted. His wife said that she noticed this yesterday morning before our visit. He complains that he cannot feel in his legs. He does not seem to feel when the catheter is passed. His feet are rather hot, and he has no sensation whatever in them, nor in the skin of the penis. He has slight sensation in the skin of the pubes. There does not appear to be any hyperæsthesia of the boundary line. There is no sensation in the skin of the thigh till we come to within an inch of Poupart's ligament on the right side. On the left side he has obscure sensation for six inches below Poupart's ligament.

21*st.*—He is gradually recovering power in his right internal rectus.

24*th.*—His pulse is 126. He still has complete ptosis. He cannot raise his right eyelid in the least. The eyelid falls so as to leave a chink of about a quarter of an inch. The pupil acts quite well, and is quite as small as the other. He cannot get the eye into the inner canthus, but can carry it considerably beyond the middle line. He uses the superior and inferior rectus, but imperfectly. He has no pain in his head. His tongue is much cleaner. His countenance is dusky. He complains much of inability to sleep at night, and has some difficulty of breathing. There does not seem to be any difference in the power of the two hands. For the first time he had a free loose motion this morning. It passed from him without his knowledge.

31*st.*—There is now no dilatation of pupil and very little squint. He feels when the catheter is passed. The urine runs away freely, his bladder having recovered its tone, while the sphincter remains still paralyzed. All this time he has been lying on a water-bed, and has no bed-sore, a fact which favours the practice of placing fractured-spine cases on water-beds from the very first.

June 14*th.*—In the left limb he can feel indistinctly a little below the knee. At the knee, he says he feels equally well (that is, very slightly), at the inner and outer sides. On the right side he cannot feel below the hip. He frequently complains of much pain in his left thigh. [It is somewhat unusual to find loss of sensation in the urethra, with a paralyzed sphincter, whilst yet the bladder retains such good muscular power.]

He remained in much the same state—his countenance becoming more dusky, his pulse becoming quicker and feebler—till he died, quite quietly, on July 2nd.

The *post-mortem examination* was performed somewhat imperfectly. It was ascertained, however, that the body of the last dorsal vetebra was crushed, and that at the site of fracture the cancellous tissue was discoloured and green. The cord was crushed. There was no blood in the theca. The adjacent laminæ were irregularly fractured, but all displacement had been spontaneously rectified, and the cord was not compressed. The brain was examined, and nothing conclusive discovered to account for the symptoms of paralysis of the right third nerve, which had been present. The nerve-trunk was torn at its origin, but it was impossible to feel sure that this had not been done during the examination.

CASE XIV.—*Fracture of the first and second lumbar vertebræ, with partial crushing of the extremity of the cord.—Imperfect paralysis of lower extremities.—Suppuration at seat of fracture, and death on twenty-first day—Post-mortem examination.*

(Under the care of Mr. Hutchinson.)

J. Linnell, aged 36, was admitted on the 30th of April, 1865. He had fallen into a dry pit, forty-five feet deep, but no account could be obtained of the exact way in which he struck the bottom.

He was reported to have been insensible on admission. The next morning he had regained consciousness, but did not know in the least what had happened to him. He could then move the left leg slightly, but he could not move the right at all. He could move the toes of both feet a little.

He did not appear to feel above the knee on the right side, but he could more or less all over the left leg and thigh.

His left pupil was smaller than the right and did not act; it was not, however, materially contracted. As he lay in a rather dark corner of the ward, his right pupil was freely dilated.

During the first few days he had extreme difficulty of breathing in connexion with the fractured ribs and sternum. After a while, however, he became more comfortable. Death took place on May 20th.

Notes of post-mortem examination.—About half-an-inch from the sternum there is a very visible irregularity, the lower end of the upper fragment being depressed almost half-an-inch. On cutting the skin, bruising of the pectoral muscle was found above and below the irregularity, but more extensively below. There was none in the deeper parts of the muscle nor beneath it. The skin showed no evidence of contusion before it was cut. On removing the soft parts we find that the prominence is just above the level of the second rib. (See specimens described at p. 352.) On the right side also in the lateral region there are numerous extravasations. There was no rigor mortis in the left arm, and not nearly so much as usual in the right. There was also less than usual in the lower extremities, but equal on the two sides. The cartilage of the first rib was broken through about its middle. The outer fragment was depressed behind the inner one, and was still quite moveable. The sternum was fixed at the seat of fracture. On removing the sternum ecchymosis was observed in the cellular tissue, between the bone and the pericardium. There were no pleuritic adhesions whatever. The lungs were pale and crepitant throughout, and there was scarcely any congestion of the posterior lobes. There were a few patches of emphysema here and there. On removing all the viscera a fracture of the eighth rib on the right side, near its angle was found, and there was also an appearance of rupture of the pleura for an inch and a-half, but which was now cicatrised. The lung showed no trace of injury. There was ecchymosis into the psoas muscles on both sides of spine. On the right side the parts were very much bruised and discoloured, and pus escaped from a small cavity in the front of the muscle, and close to the right side of the body of the third lumbar vertebra. The abscess passed obliquely upwards, and was connected with a fracture of the second lumbar vertebra. There was movement at the chief seat of fracture in the body of the first lumbar vertebra. The body of this vertebra was completely crushed, but the spinal column was perfectly straight, there being no permanent displacement. On the left side there was comparatively little ecchymosis, but on the right side the upper roots of the lumbar plexus were surrounded with effused blood, and the muscular substance in which they were embedded was softened and almost in a state of suppuration. The extremity of the spinal cord was crushed, but the nerves constituting the cauda equina did not show traces of much injury.

Case XV.—*Fracture, with permanent displacement, in the lumbar region.—Incomplete paralysis of lower extremities.—Temporary paralysis of coats of bladder, and intestines, and permament paralysis of their sphincters.—Death from pyæmia.—Post-mortem examination.—Partial crushing of the cauda equina.*

(Under the care of Mr. Curling.)

In the following case the back was much contused, but no irregularity of the bones could be detected. Doubt was felt by some as to whether it was mere concussion of the spine or a case of fracture.

William C., aged 42, was admitted February 26th, 1866, into the London Hospital, under the care of Mr. Curling. He said that while stooping beneath the tail-end of a cart loaded with straw, by some means or other, perhaps by the violence of the wind the cart was tilted up, and he received a violent blow across his back. He declares that his back was doubled up by the violent blow. Immediately after the accident he said that " his back was broken," and he could not lift his legs.

March 1st.—When the writer first saw him, about three days after the injury, he could use all the muscles on the fronts, but not those on the backs of his thighs nor those of his legs. Thus he could draw up his knees, but could not put them down again ; he could not feel in the soles of his feet at all; he could feel down the fronts of his legs, and both on the inner and outer sides, but better on the former. The margins of failure of sensation in the legs were not at all definitely marked; he had some slight sensation in all parts, excepting the soles of his feet.

From this date, until that of the next note, no details were recorded. In the meantime he had become pyæmic, and was very ill.

28th.—At first he had retention requiring the use of the catheter. Now his urine dribbles away ; he could feel the catheter sometimes ; he has been twice purged after taking medicine, and each time his motions have passed away without his knowledge. Masses of fæces can now easily be felt in his colon through the abdominal wall. He has had during the last week or ten days a succession of rigors; he has a large bed-sore; his tongue is almost clean, but dry ; his pulse is 100, and his skin is cool. He is too ill to permit of accurate trials as regards sensation, but the state of his lower extremities appears to be much as at first note.

Death followed a few days after the last note, with all the symptoms of advanced pyæmia. The pyæmia was probably in connection with the bed-sore, and had nothing directly to do with the fracture or injury to the cord.

The autopsy shewed a dislocation forwards of the second lumbar vertebra with fracture of the body. The cauda equina was lifted on a bridge of displaced bone. The specimen, an exceedingly interesting one, has been kept. See description at p. 355.

CASE XVI.—*Fracture, with displacement, and crushing of the cord at the fourth dorsal vertebra.—Priapism.—Paralysis of lower extremities and greater part of trunk.—Paralysis of vaso-motor nerve of upper extremities (?).—Diaphragmatic respiration.—Death from engorgement of the lungs, &c., on the fourth day.—Post-mortem examination.—Extreme pulmonary consolidation.*

(Under the care of Mr. Hutchinson.)

William Duggan, aged 35, was admitted Feb. 20th, 1866 ; he had fallen a distance of thirty-five feet from some scaffolding ; he was carried into the Hospital in collapse, being very pale ; he complained much of pain in his neck and chest ; the paralytic symptoms were well marked.

February 21*st*.—(The next day.) He says he does not know how he struck the ground, as he lost his senses before he got half way. His pulse is now full, almost bounding, 84 in the minute, and his skin is hot ; his breathing is diaphragmatic ; the chest " thumps up " in expiration, and he seems to have complete loss of sensation from the nipples downwards. Crepitus can be felt as he breathes, below the right sterno-clavicular articulation, and somewhat to the outer side. Moist crepitation is heard all over the chest, and there is a doubtful friction sound on the left side. He is very much troubled with mucous collecting in his throat ; he cannot cough it up, owing to the paralysis of his chest. Lower extremities completely paralyzed in every respect, upper ones not involved. He can use his great pectoral muscles, but no action of the latissimus dorsi muscles can be detected. Both his feet and hands are hot to the touch, his hands feeling hotter than his feet ; his posterior tibial arteries are throbbing ; his pupils in the shade are of equal and moderate size, and equally

and fairly active.   The temperature of both inner ankles is 101°, that of the palms of the hands 104.°   There is a moderate degree of priapism.

22nd.—Much as yesterday.   He can feel in the tract of skin supplied by the inter-costo-humeral nerve, therefore the fracture is below the second dorsal vertebra.   His face is dusky, and his hands and feet and legs, although so hot to the touch, are quite pale.

[This fact, that the hot limbs were still pale, would appear to favour the view that increase of temperature depends upon some other influence beyond the mere fulness of the cutaneous capillaries, consequent on vaso-motor paralysis.]

After this he remained in much the same condition, his face getting more dusky, but without any great distress of breathing.   He was delirious at times.   He died quietly about one o'clock on the morning of the 23rd.

At the *post-mortem examination,* we found a fracture of the body of the fourth dorsal vertebra, with fractures extending in various directions through the adjacent laminæ, and permitting of free motion.   Neither the anterior nor posterior common ligaments were torn.   After the broken laminæ had been taken away the theca was exposed.   There was no blood in the canal external to the theca, and the theca itself showed no signs of injury.   It was clear that the displacement had been of the upper part forwards.   On laying open the theca no blood was found within it, and the surface of the cord, both before and behind, shewed no signs of contusion. On cutting into the cord, however, it was found to have been completely crushed internally at the seat of injury, and for the length of an inch was in a state of blood-stained pulp.   Above, and below this, it was healthy.   The spinous processes of all the dorsal vertebræ, excepting the fifth and twelfth, were broken off.   On the right side, the fourth and fifth ribs were broken close to their articulations, and the fourth was broken on the left side.   There was a considerable amount of effused blood in the cellular tissue about the vertebræ, both before and behind, in the whole of the dorsal region.   The manubrium of the sternum was separated from the body, but without rupture of the periosteum, either before or behind.   It was loose enough to permit of considerable motion.   A disc of cartilage, two lines in thickness, was attached to the body of the bone.   The fourth

and fifth ribs, on the left side had their cartilages broken through, close to the sternum. Both lungs were in a state of almost universal hepatization, only small portions in front, and especially at their free edges, containing any air whatever. The lung-tissue, where hepatized, was quite solid, black, firm and leathery: It readily sank in water. There was a red margin of abrupt distinction between the crepitant and the solidified portions. The whole of the left lung was placed in water, and it sank with the exception of a very small portion in front. The heart was large and flabby. Its right chambers contained a softish fibrinous coagulum, and little or no fluid blood or coloured blood-clot. The left chambers, although the walls were flaccid, and the cavities large, contained absolutely nothing. In the abdomen there were evidences of contusion at many parts. Thus the mesentery was ecchymosed, and there was blood in the cellular tissue around each kidney. There were three or four superficial lines of laceration in the cortical substance of the right kidney, posteriorly. The spleen was large, and very soft. The bladder was flaccid and contained about a pint of urine. All the intestines, especially the lower tracts, were distended with flatus. The rigor mortis was well marked, especially in the lower extremities. It seemed to involve all the muscles, excepting those connecting the arms to the chest, and those of the neck. The penis was in a condition of semi-priapism. (See specimens, p. 351.)

Case XVII.—*Fracture, with displacement in the mid-lumbar region.* *—Symptoms of spinal injury not recognised at first.—Incomplete paralysis of lower extremities.—Recovery.*

(Under the care of Mr. Hutchinson.)

William Moore, aged 23, was admitted on the 19th of August, 1865, having received injuries in a fall from a house. Both ankles were severely sprained, and attention was at first directed only to these. He had no bladder- or intestinal-symptoms, and it was only when, after five weeks in bed, he was allowed to get up, that he found one lower extremity much weaker than the other. On examination, both proved to be wasted—partially paralyzed. From the symptoms then present, and the discovery of irregularity in the lumbar region there could be no doubt that fracture had occurred. Probably the cauda equina had been partially crushed at or about the fourth lumbar

vertebra.   Mr. Hutchinson had not himself examined the patient, until the date of the note, when the following particulars were dictated :—

September 18*th.*—There is a decided irregularity in the situation of the second lumbar vertebra, or thereabouts.   He feels everywhere and tolerably acutely in the right lower extremity.   In the left limb sensation begins to be dull at the knee, and is least in the middle of the leg.   He can lift the right leg from the bed, but he does it feebly and slowly.   He cannot lift the left leg from the bed at all.   The muscles of the left are everywhere thinner and more flabby than those of the right, and on both sides they are more flabby than natural.   He can feel on the inner side of the left great toe (long saphena), but not on its dorsum.   The numbest part is on the outer side of the middle of the leg.   Sensation is not absolutely lost at any part, but he often does not feel a light prick with a pin. The inner aspect of the leg (supplied by the long saphena) appears to be as numb as the other parts.

After this electricity was used, and with gradual benefit.   The man became able to move about with crutches, and being very desirous to return home, he was allowed to do so on the 26th of September.

Present state.—(August 16th, 1866) we learn from his brother, (not having been able to see the man himself), that after he left the Hospital he continued to use crutches until Christmas.   Since that time he has been able to walk without assistance, but still does not walk well.   He is not able to do a day's work.

CASE XVIII.—*Fracture in the cervical region, with displacement, but without crushing of the cord.—Recovery with paralysis of the right arm.*

In this case the patient was a woman of middle age, who came under Mr. Hutchinson's care four months after her accident, on account of partial paralysis of her right arm.   She was in good health, and had quite recovered in all other respects.   Her accident had consisted in a fall from the top to the bottom of a flight of stairs, and she fell with the neck doubled under her.   She was at once carried to St. Bartholomew's Hospital, where she remained for six weeks, during the first part of which time she was very ill.   She assured

Mr. Hutchinson that the House-Surgeon at St. Bartholomew's, throughout her illness, was very positive that her spine was broken, but that Mr.——— the surgeon under whose care she was, would not accept the diagnosis.

When this patient came under care at the London Hospital, there could be no doubt as to a fracture, with displacement, having occurred in the lower part of the cervical region.   There was very considerable irregularity of the bones.   Her right arm was still paralyzed to a considerable extent.

CASE XIX.—*Fracture in the cervical region, with displacement, but without crushing of the cord.—Recovery with partial paralysis of the right arm.*

This case is almost the counterpart of the preceding one.   The patient, an Irishman, aged 34, was, whilst drunk, thrown down stairs, and was taken up insensible.   His comrades concealed what had happened, and kept him at home without medical advice for some weeks.   During this time he was in bed, had almost complete paralysis of his right arm, and very imperfect use of his other limbs. At the end of six weeks, he consulted Mr. Hutchinson at the Hospital.   In the lower part of the cervical region, there was marked and considerable irregularity, so that there could be no doubt whatever that a fracture, with displacement, had occurred. The man could run and walk well, but some of the muscles in his right arm were quite paralyzed, and the whole arm was much weakened.

These two cases may be compared with Case XII.   In none did the injury involve a crush of the spinal cord.   Probably the vertebræ were fractured and twisted laterally, so that the nerve-roots, or their trunks were damaged, rather than the cord itself.

A DESCRIPTIVE LIST OF THE SPECIMENS RELATING TO INJURIES TO THE SPINE IN THE MUSEUM OF THE LONDON HOSPITAL.

Dislocation of lumbar vertebræ forwards.   (G. b. b. 1.)

The last dorsal and three upper lumbar vertebræ, showing dislocation forwards of the first lumbar vertebra.   The body of this vertebra has slipped forwards for about half-an-inch on the surface of the second, crushing the latter as well as the intervertebral substance.

It remained thus displaced up to the time of the patient's death, and the wire which now retains them in position was introduced before the specimen was cleaned. On the right side the lower articular process of the first lumbar has completely left its fellow of the second, but neither of them are fractured. On the left side, however, the lower articular process of the first is broken off, and that of the second is fissured. The laminæ and spinous processes are wanting. The cord must have been crushed by the laminæ of the first lumbar against the upper edge of the body of the second, and owing to the permanent displacement it must have been permanently bent at an angle.

Note.—It is worth remark, as regards the possibility of reduction during life of such a dislocation, that the articular processes might very possibly greatly impede it. If these were broken, reduction would be much more easy, and possibly the cause why the displacement was permanent in this instance is to be found in the integrity of the articular processes on the left side.

Obtained and presented by Mr. Little. Dry specimen.

Fracture of sternum on anterior aspect.   (G. b. e. 3.)

A sternum, showing transverse fracture just below the third ribs. The ligamentous structures behind the bone are entire. Those in front are torn completely through, allowing the fracture to gape widely in front. This fracture has clearly been caused by a bending of the bone with the convexity forwards.

Obtained and presented by Mr. Little. (No. 68, in open jar.)

Dislocation of fourth cervical vertebra forwards.   (G. b. b. 3.)

The cervical vertebræ with the cord exposed *in sitû.* The laminæ and spinous processes have been removed, and the theca laid open. The cord is seen beautifully clear and free from lymph or blood-clot. It does not reveal externally any trace of injury. Very probably, however, if cut into, it would be found to have been crushed. Anteriorly, the anterior common ligament is seen to be partially torn between the fifth and sixth vertebræ, and the body of the fourth is displaced slightly forwards on the body of the fifth. The displacement at present is very slight indeed. The notes state " that the

specimen was removed from a man, aged 60, who had fallen down some stairs at Wapping, and who was admitted with all the symptoms of fractured spine. His lower extremities were completely paralyzed, and the upper ones partially so. He died twenty-four hours after his admission. The theca and medulla appeared little injured. The sternum was fractured. No injury to the thoracic viscera was discovered." This specimen is an excellent instance in proof of how slight may be the external evidence of injury to the cord. No doubt the fracture of the sternum was caused by the man's chin.

Dislocation of fifth cervical vertebra.   (G. b. b. 4.)

The cervical vertebræ showing displacement of the fifth forwards on the sixth. The spinal canal has not been opened. At present the vertebræ are almost restored to position. The body of the fifth is still slightly forwards, the intervertebral substance, and probably the vertebræ also has been crushed. The ligaments connecting the articular processes of the vertebræ have been torn, and from the mobility, at the site of the displacement, it may be gathered that a complete dislocation forwards occurred. The laminæ are not fractured, but there appears to be a fracture across the bone of the transverse process of the sixth on the right side. No history has been preserved with this specimen.

Dislocation of lower dorsal vertebra.   (G. b. b. 5.)

The lower dorsal vertebra. The spinal canal laid open from behind and the cord exposed. No history has been preserved with this specimen, but probably the patient lived for some little time after the accident. The cord is completely disorganized for about an inch in length, the lower part of the disorganized tract being about half-an-inch above its termination in the cauda equina. It would appear that the tenth dorsal vertebra has been displaced forwards on the eleventh. The displaced at present existing in the specimen is very considerable. The upper edge of the body of the eleventh projecting backwards into the canal, and constituting a bridge half-an-inch in height on which the extremity of the cord is lifted. The body of the eleventh vertebra would appear to have been crushed, and from the discoloration in front of the bone it may be inferred that inflammation followed at the seat of injury.

Displacement of lowest dorsal vertebra.   (G. b. b. 6.)

The lower dorsal and first lumbar vertebræ, showing displacement forwards of the last dorsal on the first lumbar.   The intervertebral substance between these bones would appear to have been crushed. The cord is *in situ,* and in the specimen as it at present exists, there is no material displacement.

Crushed cervical cord.   (G. b. b. 7.)

Portion of the cervical spinal cord, shewing the effects of crushing in dislocation of vertebræ.   In about three quarters of an inch the cord is completely disorganized and infiltrated with blood-clot. Above and below this part it is quite healthy.   The theca was uninjured, and there was no blood in the arachnoid sac.

Obtained and presented by Mr. Hutchinson.

Crushed cervical cord.   (G. b. b. 8.)

A precisely similar specimen.   The cord is laid open by a vertical incision, and although there was but little external evidence of injury, it is seen to be disorganized for upwards of an inch.

Obtained and presented by Mr. Hutchinson.   (These two specimens are in the same bottle, open.)

Fracture and displacement of fourth dorsal vertebra.   (G. b. b. 9.)

Part of the spinal column of W. Duggan.   The anterior common ligament is entire.   Free motion is permitted between the fourth and fifth vertebræ, the fourth having been displaced half-an-inch forwards on the fifth, and its body crushed.   The posterior common ligament, although stretched, is not torn through, excepting at some parts. The laminæ of the fourth and fifth are irregularly fractured, and the fourth and fifth ribs on the left side are broken close to their articulations.   The spinous processes of all the dorsal vertebræ, as low as the tenth, are broken off.   With this specimen is preserved the left half of the sternum and portions of the ribs.   The manubrium has been separated from the body of the sternum.   It is quite loose, but the periosteum is not torn, and there is no displacement.   The disc of cartilage remains in apposition with the lower fragment.

(No. 61 in open bottle.) Obtained and presented by Mr. Hutchinson.

Dislocation backwards of the fifth cervical vertebra.   (G. *b. b.* 10.)

Six cervical and two upper dorsal vertebræ, from a case of disloca-
tion backwards, at the fifth cervical.   Considerable displacement
backwards is permitted, and the structures in front having been
completely torn gaping to the extent of half-an-inch may be caused.
Posteriorly, the ligaments connecting the articular processes on the
right side had been completely torn, so that it would appear that the
head and neck had been bent backwards and twisted over with the
face to the right shoulder, and the occiput over the left scapula.
The intervertebral substance, between the fifth and sixth, has been torn
up.   There does not appear to have been any material fracture.   The
inter-spinous ligaments are much stretched, but only partially lacerated.
The nerves constituting the brachial plexus have been left in con-
nection with this specimen.

No. 84, in open bottle. See sternum 84. Obtained and presented
by Mr. Hutchinson.

Fracture and displacement of first lumbar vertebra.   (G. *b. b.* 11.)

Four lumbar and one dorsal vertebræ, shewing crushing of the
body of the first, and displacement of the first forwards upon the
second.   The body of the vertebra has been completely smashed.
The posterior common ligament has been almost completely torn,
and a sharp strong ridge of bone, constituting the lower half of the
body, projects upwards into the spinal canal, and must have com-
pressed the cauda equina.   (Case of J. Linnell, p. 341.)

(No. 40, in open bottle.)   Presented by Mr. Hutchinson.

Crush of the lower extremity of spinal cord.   (G. *b. b.* 21.)

A spinal cord, showing the extremity of the spinal cord crushed,
close to the lowest filaments of the cauda equina.

(See case XIV. J. Linnell.)

Double fracture of sternum, with displacement and overlapping.
(G. *b. e.* 5.)

There is separation at the junction of the manubrium with the
body, and the manubrium is displaced behind the body with half-an-
inch of overlapping.   There is a second fracture through the body of

the bone, about half-an-inch lower down, which would appear to have been produced by pressure of the lower part of the manubrium against it. The ligamentous structures are entire, both in front and behind, the fractures being wholly intra-periosteal. The extremities, both of upper and lower fragment, are capped with cartilage. Ossification is in progress, a strong bridge of new bone having been developed in connection with the periosteum, which has been detached behind the bone. (See Case XIV., J. Linnell.)

Dislocation of seventh cervical vertebra with fracture.(G. b. b. 12.)

Two lower cervical and four upper dorsal vertebræ, showing displacement forwards of the last cervical on the first dorsal vertebra. Neither anterior nor posterior common ligaments have been torn. The displacement in the specimen is to about a quarter of an inch, and there is no very material intrusion into the calibre of the vertebral canal. The body of the vertebra has been somewhat crushed.

(No. 47, in open jar. See case III., Thomas Green). Obtained and presented by Mr. Hutchinson.

Fracture of fifth cervical, with displacement.   (G. b. b. 13.)

The cervical vertebræ, showing complete crushing of the body of the fifth, and dislocation of the fourth, forwards on it. The displacement has been considerable, and there is a longitudinal rent an inch long in the posterior common ligament, caused by a sharp edge of bone. The laminæ of the fourth and fifth are fractured on the right side. The movement permitted is very free, and consequently the displacement was not permanent.

(No 34, in open bottle.) Obtained and presented by Mr. Hutchinson.

Dislocation forwards of sixth cervical vertebra.   (G. b. b. 14.)

Dislocation of the sixth cervical vertebra forwards on the seventh. The displacement has occurred at the intervertebral substance, and there does not appear to have been any fracture whatever, excepting of the edges of the articular facets. The articular ligaments, ligamenta subflava, and the inter-spinous ligaments have all been torn completely through. Free motion is permitted, and there is no permanent displacement. (The spinal canal has not been opened.)

(No. 83, in open bottle). Obtained and presented by Mr. Hutchinson.

Separation of odontoid process and false joint.   (G. *b. b.* 16.)

This specimen is fully described in Vol. I. of *London Hospital Reports,* p. 142.   Obtained and presented by Mr. Curling.

Fracture of sixth cervical vertebra with displacement.   (G. *b. b.* 15.)

The cervical vertebræ and first two dorsal, showing complete separation between the fifth and sixth.   The body of the sixth and its intervertebral substance are crushed.   There would appear to have been great displacement at the time of the accident, and the anterior common ligament is torn completely through.   The posterior common ligament is considerably injured.   The laminæ and cord have been removed.

Wound of spinal cord by a stab.   (G. *b. b.* 17.)

A spinal cord almost cut across by a puncture in the mid-dorsal region.   The patient had been stabbed in the back by a narrow knife, and was admitted with incomplete paralysis of the lower extremities.   She died about a fortnight afterwards.   The knife had entered obliquely beneath the laminæ of one of the dorsal vertebræ, and had crossed the spinal canal from the left to the right, severing the greater part of the spinal cord.   The vertebra is preserved, and a piece of wood introduced shows the direction of the puncture.

Obtained and presented by Mr. Maunder.

Anchylosis of dorsal vertebræ and subsequent fracture.   (G. *b. b.* 18.)

This specimen is probably unique.   It consists of the sixth, seventh, eighth, ninth, tenth, eleventh and twelfth dorsal vertebræ.

On the right side, the bodies of the ninth, tenth, eleventh and twelfth are firmly welded together by a deposit of dense new bone, external to them, and continuous across the intervertebral substance.   This deposit ends below, in the middle of the body of the twelfth, but above, it is continued as high as the specimen permits of examination, and possibly passed considerably higher.   It is much thinner and weaker in front of the upper than of the lower vertebræ, and has been broken across in the line of the intervertebral substance, between the

sixth and seventh, seventh and eighth, and eighth and ninth.   The body of the ninth is crossed by a vertical fracture, which passes obliquely from the left to the right side.   During life there was no displacement, and no symptoms of injury to the spinal cord.   The patient, a middle-aged man,* walked into the Hospital.   The fracture of the spine was only discovered at the *post-mortem.*

Obtained and presented by Dr. John Dawson.

Dislocation of the third lumbar vertebra from the fourth. (G. b. b. 19.)

The displacement has occurred by crushing of the intervertebral substance ; there is very slight splintering of the edges of the bones themselves at one or two spots.   The third vertebra is nearly half-an-inch in front of the fourth, and the cauda equina is elevated on a sort of bridge formed by the projection backwards of the latter. There was no laceration of the theca, nor any extravasation of blood.   The cauda was not crushed, but only somewhat contused and stretched, and the paraplegia, which the man presented, was at first incomplete. He died of pyæmia.   At the back of the spine the injury was a dislocation without fracture, the articular processes of the two vertebræ having been completely displaced from one another.

Presented by Mr. Curling.

Dislocation of third lumbar vertebra. (G. b. b. 20.)

The laminæ, etc., of the lumbar vertebræ from the same case as the preceding specimen, showing a clean dislocation forwards without fracture.   The articular processes of the third lumbar vertebra have completely left those of the fourth, and passed forwards, a third of an inch. The ligamentous structures connecting the laminæ and spinous processes have been very much stretched and elongated, but not materially torn.   There is no important fracture.   The edges of the articular processes have been a little chipped by pressure against each

* The Museum contains a specimen of anchylosis of the vertebræ of a horse, which is almost the precise counterpart of the one above described. In each instance the anchylosis is by a long belt of bone in front of the bodies, and in each only one side is involved.   In neither are the intervertebral substances involved.   See Mr. Rivington's description of it in *London Hospital Reports*, Vol. ii., p. 371.

other, and there is an incomplete fracture, without displacement, through the spinous process of the fifth.

Presented by Mr. Curling.

Incomplete fracture in anterior aspect of sternum.   (G. *b. c.* 4.)

The upper portion of a sternum, showing an incomplete fracture just above the second rib, and about the junction of the manubrium. The bone is not broken behind, there is merely a fissure in its anterior wall.   There is consequently no displacement whatever.   By firm pressure, the line of fracture may be made to gap a little.   Clearly the bone has been bent with its convexity forwards.

(See specimen 84, in open jar).   Obtained and presented by Mr. Hutchinson.

Fracture of sternum on posterior aspect.   (G. *b. c.* 2.)

A sternum, showing transverse fracture just above the level of the third ribs.   The ligamentous structures in front of the bone are entire.   Those behind it are torn completely through, allowing the fracture to gape widely towards the mediastinum.   The fracture was no doubt caused by the patient's chin.

(No. 25, in open jar.)

Postscript.—Fractures of the sternum have been mentioned in the above list, whenever such fracture had occurred in connection with injury to the spinal column.

Since the sheet containing Case I. was printed off, additional information has been obtained respecting the subject of it.   Mr. Ditchett reports that he met the man (W. Asher) in the street a few months after he had left the Hospital, and that he was then able to walk well, still, however, using a stick.   He had not regained control over his bladder, and habitually employed a catheter which he carried in his pocket, in order, by frequent use, to prevent the inconvenience of overflow.

ON DISLOCATIONS AND FRACTURES OF THE SPINE.

A Clinical Lecture.

By JONATHAN HUTCHINSON, F.R.C.S.

GENTLEMEN,—I wish to give you a summary of the clinical experience we have obtained recently in reference to displacements occurring at one or other part of the spinal column. Interesting examples of these injuries are almost constantly under our observation, and they supply us with very important illustrations of many physiological and anatomical facts, and they also call for a sound knowledge of their requirements in reference to treatment.

I shall enter at some length into the consideration of certain special symptoms, and also into the examination as to what are the conditions usually met with in the injured parts. One object which I have in view, is to furnish conclusive arguments in support of the usual practice at this Hospital of abstaining from operative interference. I have taken part in not a few consultations where the question of operation was entertained, and have always dissuaded from it as strongly as I could. Until a very different body of facts are collected from those to which I shall allude, and some of which are illustrated by specimens contained in these jars, I shall continue to do so. My assertion is, that a good many cases recover, if put under favourable circumstances and let alone, and that of those which end in death, very rarely indeed, can it be asserted, after *postmortem* examination, that an operation could by the barest possibility have done any good. In the great majority, then, since it could have done no good, its effect would have been to increase the patient's sufferings, and aggravate his danger.

I purpose to deal only with those injuries to the spinal column in which its contents are implicated. Fractures of external parts of the vertebræ, the spinous processes, etc., are frequent, but they present no features of special interest. I shall not attempt any abrupt distinction between a "fracture of the spine" and a "dislocation of the spine." In nearly all cases there is more or less of fracture and more or less of displacement. It is quite possible, especially in the cervical region, that the fracture may be very trifling, and the injury an almost pure dislocation. Lower down, where the bodies are larger, if much displacement has occurred, the body is almost certain to be fractured. The question of the *degree of displacement* is that which concerns us as practical surgeons, not whether this has been affected with or without severe fracture of the implicated bones.

I must, first by way of introduction, ask your attention to a few details of anatomy.

In the cervical region we have eight nerves and only seven vertebræ, and, with the exception of the last, the nerves are named from the vertebræ, above which they come out. Thus the fourth cervical nerve, the one of most importance as regards the diaphragm, comes out above the fourth cervical vertebra, and would escape if the cord were crushed on a level with the latter. The eighth cervical nerve, however, comes out below the seventh cervical vertebra, and would of course be implicated in fracture of the body of the latter. So on, through the dorsal and lumbar regions, the nerves take their numerical designation from the vertebra below which they come.

Certain other anatomical considerations must, however, be kept in view before we can hope to give a satisfactory conjecture from the nerves involved in paralysis as to the vertebra which is fractured. When the body of a vertebra is loosened so that movement is permitted, the movement always takes place between it and the one below it. The cord is consequently crushed a little below the displaced bone. If the injury involve two vertebræ, I believe this rule will still usually hold good, the chief lesion of the cord will be at the lowest part of the fracture. Thus, supposing the neck to be violently bent forwards till the body of the fourth cervical vertebra gives way, this latter will slide forwards on the body of the fifth, the cord will be crushed by the lower edge of the laminæ of the fourth against the upper edge of the body of the fifth. Not only will the fourth cervical

nerve escape injury, but, very possibly, the fifth also, as the latter occupies the large intervertebral foramen, and may easily escape crushing. We must also bear in mind that the filaments which constitute the nerve-roots come off obliquely, and all of them slant downwards. Even within the vertebral canal this obliquity is considerable, and the practical result is, that a nerve comes off from the cord in reality considerably higher up than its name might imply.

All these considerations tend to one general rule, which is this, that when we hear of fracture of any given vertebra, we must make an allowance, and understand that the nerve-supply will be cut off considerably lower than the name of the vertebra would seem to imply. On the contrary, when we are examining a patient during life, and find complete paralysis of certain nerves, we may feel sure that the fracture is really one or two vertebræ higher up than those nerves are said to come out from the spine.

The statements made above, apply only in a general way, for many accidental circumstances interfere with their applicability in all cases. Thus not only may the cord be crushed by the movement of one vertebra on another, but the nerve-roots may be crushed or torn, or the nerve-trunks may be stretched or contused, or ecchymosed, even at some little distance from the foramen, and thus irregular paralytic symptoms will result. Thus, for instance, if the cauda equina have been crushed by displacement of the bones at the fourth lumbar, in all probability the chief part of the anterior crural nerve will escape, and with its escape we shall have the curious symptoms of retained sensation on the inner aspect of the ankle and foot, and at no other parts (long saphenous). It is very possible, however, that the trunk of third lumbar nerve may have also received a separate injury, either from fractured lamina, or from stretching, or from contusion.

I am convinced that lesions of nerve-trunks from violence are more common than they are supposed, and feel sure that, in the diagnosis of injuries to the cord, we must not infrequently make allowance for the possibility of their presence as complications of the principal mischief.

With regard to the lesions usually met with in the *post-mortem*-room, I may venture the following assertions. I think that they are based on the examination of, at least, twenty cases :—

First.—Permanent compression of the cord, or of any part of it, is

a very rare event. The cord has usually had a sudden crush during the violence, and when the latter was remitted, the bones sprang back by their own elasticity, and that of the intervertebral substance, and the column was restored almost to its original position. Remember that the vertebral canal is large, and that slight irregularities of the bones and projections of parts of them inwards, may easily be permitted without any pressure upon the cord. You will often, indeed, usually, find some permanent irregularity in the vertebral canal, but it will not be sufficient to influence the cord in any way. In one case I found the trunks composing the cauda equina lifted a third of an inch on a bridge of bone formed by the displacement of a fractured lumbar vertebra, but they were in no degree compressed, and, excepting a little ecchymosis in their pia mater, showed scarcely any trace of injury. Mr. Little obtained for our Museum a few months ago the specimen which I now show, and in which the permanent displacement is very considerable ; still, however, short of actual compression. From my own experience I should not think that permanent displacement to any material degree is met with once in ten cases.

Second.—As might be expected from the fact that almost all the more serious injuries to the spinal column are due to indirect violence (bends) ; the fractures of the laminæ are of little consequence, and never cause compression of the cord. If the fracture were caused by a direct blow on the part, then it is quite possible that a lamina might be driven into the vertebral canal and there remain, but against such an injury these bones are exceedingly well protected, and such are, indeed, very rare. In almost all our cases the laminæ, spinous processes, etc., are more or less fractured, but I have never yet seen a case in which any of the fragments were in contact with the cord.

Third.—Having thus denied that the cord is *permanently* compressed, either by the bodies or the laminæ, I now extend my statement to extravasations of blood. You will hear much talk about effusions of blood into the vertebral canal, indeed, this lesion is constantly invoked to explain the existence of paralysis where it is fancied that the bones are not fractured. Large effusions of blood, whether in connection with fractures or contusions of the spine are, I believe, amongst the very rarest occurrences. I have never myself seen any effusion to the extent of possible compression, and in the majority of cases there is little or none. The injury is a crush, and is not one

at all likely to cause much bleeding. There are no large arteries to be injured. When you examine a specimen of fractured spine, you will find the muscles and soft parts externally much ecchymosed, there will be also a few small blood-clots adhering to the edges of the broken bones, but there will be little or no blood between the bone and the theca, and none at all in the thecal cavity. I speak of what is usual, and am well aware that exceptions may occur. The theca (dura mater) is very rarely torn, and often, on exposing it, you might imagine that the cord was not injured. Nay, even further than this, you find the pia mater of the cord entire and without ecchymosis, and only on slicing the cord through do you discover that its substance has been utterly smashed. I show you a sketch of a cord thus injured. You will see that the cord-substance, for nearly an inch and a-half, is reddened by effused blood, and its substance broken into a diffluent pulp. Yet, in this instance, the pia mater was still entire.

Fourth.—Instances of great displacement of one vertebra do sometimes occur. They are exceptional, however, and very rarely of a kind which we could rectify by force or by operation. I have no doubt that many displacements of the vertebræ are reduced by the by-standers who pick up the man. To straighten his neck and trunk is the first thing which common-sense dictates, and in doing so, reduction is usually effected, as far as reduction is practicable. In the cervical region, from the shape and position of the articulating processes, replacement into almost normal position is usually easy. As we pass downwards it is likely to become more difficult, and in the lower dorsal and lumbar regions, if once the articular processes have completely escaped from each other, I do not believe that replacement would be possible. After you have cleaned the bones, and have them in your hands and exposed to sight, you can only, by considerable force, put them again into position.

Fifth.—The cases in which, during life, there is evidence of considerable displacement are not by any means always the most serious ones. The irregularity, perceived externally, concerns rather the spinous and transverse processes than the bodies, and it is very possible that they may have been fractured without any crush of the cord; and, on the other hand, that the bodies may have been displaced for a moment allowing complete crushing of the cord, and yet no

permanent irregularity remain. I have repeatedly conducted a dissection until every portion of muscle was cleared away from the bones before I could discover any proof of fracture. During the life of your patient inability to discover irregularity must go for nothing, as a symptom; it is common enough, even when the cord has been most severely injured.

We will now proceed to examine the various symptoms of damage to the nervous system which follow injuries to the spinal cord. I will take first a nerve, hitherto too much overlooked, the vaso-motor nerve.

Chief amongst the many discoveries for which surgeons stand indebted to physiological experimenters, are those which have explained the function and the origin of the sympathetic nerve. That this nerve arises really from the brain and spinal cord, that its integrity is damaged when those centres are injured, and that certain special symptoms follow such injuries, are facts which we owe to the researches of Claude-Bernard, Brown-Séquard, Waller, Budge, and others, and they are of the utmost importance. Scarcely second to them is the knowledge that the blood-vessels are not mere passive tubes, nor simply elastic, like Indian-rubber, but that they are muscular and capable of active contraction, liable to paralysis and subject to spasm, and that they are supplied by this same nerve, which we now call *vaso-motor*. Thus the blood-vessels may contract, and diminish the supply of blood to a part; they may dilate, and allow the part to be flooded. This dilatation or contraction, may be either general or quite local, in due relation to its special cause. Not only, however, does the vaso-motor nerve regulate the size of the blood-vessels, it supplies also the coats of the intestines and bladder, the radiating fibres of the iris, in some degree the substance of the heart, and it probably influences the functional activity of most glands.

Paralytic pyrexia, or alterations of temperature in the paralyzed parts.

I have used the term "paralytic pyrexia" to denote the state of feverishness, which is so marked a feature in the stage of reaction after severe injuries to the head. Throbbing, relaxed arteries, and great heat of skin, are its chief features; but in greater or less degree the other constitutional symptoms, usually included in the

term " pyrexia," are present; a furred tongue and dryish mouth, distaste for food, with thirst, and scanty urine. Disturbance of the circulation and enlarged calibre of blood-vessels are, however, its chief symptoms; and these we explain by supposing that the shock to the cerebral centres, has caused a temporary and partial paralysis of the vaso-motor nerve. In cases of concussion of the brain the whole of the system of blood-vessels is implicated. In cases of injury to the spinal cord, however, we have a similar state of things as far as the vessels are concerned; but it is only local, and involves of course, only the parts below the seat of injury.

After injury in the lower dorsal-or lumbar region, you will usually find the lower extremities pungently hot, and the skin feeling dry and harsh. The tibial arteries are felt with unusual ease, since they are large and throbbing. The temperature of the feet is liable to vary most remarkably with any slight changes of external condition; thus you will often find one foot much hotter than the other, or both may be hot at one time, and quite cool at another. These differences depend upon how the feet have been placed, whether one has been more protected than the other, and they are liable to increase, from the fact, that the patient not feeling his foot cold, and being further quite unable to move it if he did, is prevented from adopting any measures for its comfort.

The temperature of the extremities is liable to great variations in health. The best data, as regards that of the feet that I am acquainted with, is given by Dr. Woodman, in a table published in the first volume of our *Hospital Reports*. Dr. Woodman examined the feet of twenty persons, putting the bulb in the cleft of the great toe, and his results show an average temperature of 81·5°. The highest that he met with was 94°, and the lowest 70°. It must be observed that he has recorded but a single observation on each individual, and we have, therefore, no information as to the usual range of difference in the same person at different times. I have but few definite statements to make, further than what I have given above.

In the case of William Duggan, with fracture in the dorsal region, on the second day, the inner ankles of both feet registered 101°. In this man the skin felt very hot, but it was not florid, on the contrary, it was pale.

In the case of W. Driscoll, a boy with fracture in the lumbar region,

we found the cleft of the toes ˙100°, on a single occasion, in the fourth week after the accident.   On the day before that observation the same foot had registered 78°.   The other foot of this patient had varied in almost equal degree.

In the case of the boy Šcruby, with fracture in the lumbar region, the highest temperature ever reached by both feet, was 96°.   This was in the sixth week.   The lowest was registered a week later, and was 75°.   In both these boys the observations were made, as I have here stated, long after the accident ; and when the muscles of the limbs were already much wasted.   Should the paraplegia persist, and the patient live on, no doubt the ultimate result would be a remarkable failure of temperature, as we find it in cases of division of nerves, and in paralysis generally.   We have not recently had any such case under observation.   All our patients, who have lived, have also recovered from the paraplegia.

Paralytic myosis.—Closely connected with the paralysis of the blood-vessels is that of the dilating fibres of the iris, resulting in immobility of the pupil.   This is a very important and valuable symptom.   It occurs only when the injury is either in the cervical and upper dorsal region.   The pupil is neither dilated, nor much contracted, it is simply unable to dilate. · Unless carefully examined, the myosis being so slight in degree, may easily be overlooked.   The plan is to examine the eyes in shade, and you will then find that the pupils remain just of the same size as they were when exposed to light.   Sometimes one pupil is more definitely contracted than the other.   If the pupil is much contracted, then it is quite certain that the circular fibres of the iris are in a state of spasm, and this is probably in connection with some irritation transmitted through the fibres of the third.   I have observed this in injuries to the head, but never after injuries to the spine, although we may suppose it possible, in injuries high up in the cervical region.*

Priapism.—Another very interesting symptom, which occurs in connection chiefly with the vaso-motor nerve, after injuries to the spine, is turgescence of the penis, or priapism.   Clearly we must regard this as chiefly paralytic and passive in its nature.   The erectile

* For further details concerning these forms of myosis, paralytic and spasmodic, the reader is referred to a paper by the writer in the *Moorfields' Ophthalmic Journal*, April, 1866.

tissue of the penis consists of blood chambers, in the walls of which are muscular fibres under the control of the nervous system. If the nerves, distributed to these fibres, are paralyzed, then supposing the heart to continue vigorous, one must expect that blood will be pumped into the cells, and that turgescence will be the result. It is a symptom of precisely the same character as the hot feet, and the throbbing tibial arteries. Bearing out this explanation of its cause, we have the fact that the turgescence is never extreme. The member, although much enlarged, usually remains flaccid; quite a different state of things from what we find in the very rare examples of idiopathic priapism. The degree of turgescence varies at different times in the same patient, as does the temperature of his feet, &c. In some cases, priapism is present, in a slight degree, on the first day or two, and then disappears. Now and then, although all other reflex functions are completely in abeyance, and although the penis is absolutely without sensation, a slight amount of reflex increase of the distension may be produced. In the boy Hyde, in whom this symptom was very characteristically present, we always found that introducing the catheter increased it. This is curious, but it is in keeping with what you must have often noticed in the operating theatre, where, very frequently, after full anæsthesia by chloroform (and consequent paralysis of all other reflex functions), the introduction of the sound for lithotomy, or other steps of the operation, may induce a state of strong priapism. Curiously enough, I have never seen this occur in an adult, whilst it may happen in very young boys. Our patient, Hyde, was only 14, and in our spine cases I think I have never, in adults, known the catheter increase it.

Priapism occurs only when certain parts of the spinal cord are injured. I do not know that I have ever seen it after injuries to the head, however well-marked the vaso-motor paresis might be. I do not think that it is usually present after injuries high up in the cervical region and it is never met with after those to the lower lumbar regions. The upper and mid-dorsal region is that, after injury to which it is constantly met with and usually in a marked degree, and to this part we must, therefore, refer as the probable seat of origin of the vaso-motor nerves of the penis.

Effects of injuries to the cord upon the heart itself.—Unless the injuries be in the cervical region, no influence upon the heart's action

is observed. When high up a very peculiar condition results. The pulsations are diminished in frequency, and the pulse (from the paralysis of the artery) is remarkably full and large. Your first impression is that it is much slower than you find it to be on counting, at least, this has generally been my experience. It feels remarkably deliberate. The manner in which the heart seems exempted from all share in the patient's general excitement is sometimes very curious. I recollect well going to the bedside of a poor fellow who had been admitted a few hours before, with a fracture of the fifth cervical. It was one of those cases in which the boundary tract of skin between that quite paralyzed and that enjoying perfect sensation, was excessively tender. He was screaming with pain, and his countenance expressive of the utmost suffering and anxiety, yet his pulse which we might have expected to be quick and excited, was slow, full, and deliberate, about 48 in the minute. Although the pulse after injuries to the cervical cord becomes slow, it does not intermit. After injuries to the brain, on the contrary, as I have shown elsewhere,* it becomes slow and frequently intermittent, especially if the patient be a child.

It is of course only in the early stages that we can estimate the effects of the injury on the heart, without great risk of fallacy. At a later period the lungs become congested, or perhaps cystitis or bed-sores may occur, and by these the state of the circulation is influenced.

Paralysis of intestines.—Constipation is a symptom common to almost all forms of disease of the cerebro-spinal system. We constantly meet with it after injuries to the head, and as constantly after injuries to the upper or middle part of the spinal cord. It is customary to speak of incontinence of fæces as a symptom of fractured spine, but in reality retention of fæces is the first occurrence. As a rule, it is only after the lapse of some days, and usually only after the exhibition of a purgative, that incontinence follows. The sphincter, it is true is always paralyzed (however low down the cord may be crushed), and it offers no impediment to the escape of the contents of the bowel, but then there is no force to expel them. If the fracture be in the lumbar region, the bowels, and the bladder also, will probably within a few days or a week, regain sufficient tone to be able to expel their contents, but in other cases paralytic constipation

* The "Astley Cooper Prize Essay" on Injuries to the Head.

will often be a marked symptom throughout. In such cases the colon may be distinguished through the abdominal parietes and large fæcal masses felt in it. If the intestinal paralysis be complete or nearly so, tympanitis will be a troublesome symptom; but it would appear that much less muscular tone is requisite to make gas travel downwards than is needed for solid matters. Reflex susceptibility is rarely wholly lost by the intestines, and although repeated doses of purgatives may be requisite, sooner or later, action of the bowels may almost always be induced. I have noticed above that reflex vaso-motor function is sometimes demonstrable in the penis in cases in which there is none whatever in the more strictly spinal nerves.

In all cases in which the sphincter ani and the mucous membrane about it are paralyzed, defecation is involuntary, and is effected solely by the peristaltic action of the intestines themselves. We need not trouble ourselves to take into account the abdominal muscles, which assist in the act when voluntary, since these—whether paralyzed or not—are not called into action.

Paralysis of the Bladder.—However low down the injury may be, if it crushes any part of the cord, the sphincter of the urethra will be paralyzed, and there will consequently be no impediment to the escape of urine, excepting those offered by the position of the trunk as regards gravity, the length of the canal and its curves, etc. In almost all cases, however, the muscular walls of the bladder are themselves much reduced in efficiency, if not wholly paralyzed. Like those of the intestines, they usually recover tone in the course of a few days or weeks, according to the position of the injury. Our first symptom is, then, retention of urine, and when the bladder is full, overflow takes place. The degree of distension permitted in different cases differs very much, and by it we measure the severity of the lesion to the vaso-motor system. Often, in injuries to the cauda equina, the bladder will within a week regain sufficient tone to keep itself almost empty, and to cause constant overflow into the bed. We have no convenient vesical purgative, and custom, in cases of fracture of the spine, indicates resort to mechanical modes of relief.

There is, I think, room for much doubt as to whether the usual practice of relieving the bladder by the catheter is judicious. In a few cases where the fracture is in a certain part of the lumbar region the bladder is involved in hyperæsthesia, and the pain caused by its distension, necessitates interference. These, however, are very rare,

and, in almost all cases, the bladder fills without causing any dis-
comfort whatever, and when full runs over. After a few days it
regains a certain amount of tone, and empties itself very frequently.
At this stage we have troublesome incontinence, and but little reten-
tion. Now, if the catheter be used from the first, inflammation of
the urethra and bladder is, I think, almost certain to occur, and the
urine will become loaded with pus and mucus. I suspect that cystitis
is, in some cases, one of the influences which brings about the patient's
death by exhaustion. Not unfrequently ulcerations of the mucous
membrane of the bladder occur. There is a specimen in the Museum
of a bladder and rectum from a fractured spine case, in which a
fistula passes from the membranous urethra into the rectum, no
doubt, in connection with the use of catheters. Why should cystitis
thus constantly follow the use of catheters ? Seeing that there is no
impediment to the introduction of instruments, that they give the
patient no pain, and are used with the greatest ease, why should they
produce so much more irritation than we usually observe when they
are employed for other reasons ? I think we must admit, that it is
probable that the mucous membrane of the bladder when paralyzed,
is in a state specially prone to inflame, just as the eye is, after paralysis
of the fifth nerve. The practical question before us is, whether to
permit the retention to continue until overflow takes place, is less
likely to cause this cystitis than is the use of instruments. My own
experience has been in favour of non-interference, and I quite intend,
in the future, to make a full trial of this plan.

The prevention of bed-sores.—The same argument which I have
used in reference to the cystitis,—that it is induced in part by the
paralysis of the trophic nerves—applies to those inflammations of the
skin of the paralyzed regions which result in pressure- or bed-sores.
These occur so quickly after the injury and so certainly, that we are
obliged to suspect something altered in the nutrition of the part to
explain it. Bed-sores are a frequent cause of death after fractures of
the spine, and they sometimes form, in spite of every precaution.
Not only do they occur over the sacrum, their most frequent situation,
but on any part of the limbs, over the heels, the malleoli, the great
trochanters, etc., wherever pressure may chance to have occurred. The
sore over the sacrum often forms within a few days of the accident.
The rule of practice, which we deduce from this, is that the water-bed

ought to be had recourse to from the very first. Even with its aid, we shall not always be successful in preventing them.

Paraplegia.—With regard to the loss of sensation and of power of motion I shall, on the present occasion, be very brief. Their degree will depend upon the degree of completeness with which the spinal cord may have been crushed. If displacement of the vertebræ have occurred in any part of the cervical or dorsal regions, it is usual for the cord to be completely crushed, and then the paraplegia of both functions is complete. In the lumbar region, however, partly because the vertebral bodies are larger, and partly because it is more difficult to crush the filaments which compose the cauda equina, than the soft solid mass of which the cord itself consists, the paraplegia is often imperfect. If paraplegia be imperfect you will always find that the patient retains more sensation than motor power. Sometimes he will appear to have lost motion utterly, and to retain sensation almost perfectly. This difficulty, in extinguishing sensation, is observed, I believe, in all diseases and injuries, whether of the brain or the cord. To a considerable extent it is, perhaps, apparent rather than real. Sensation is merely passive, motion is active, and the latter probably requires a far more efficient condition of the nerve-apparatus than the former. With a partially crushed spinal cord we may easily suppose a patient unable to transmit the orders of his will through the damaged portion, whilst still a certain degree of passive sensation (requiring no exertion of his will) may remain. Another source of fallacy is the difficulty of accurate observations. A man tells you, " I cannot move my legs," and you are unable to prove the contrary, though it is still possible that a very vigorous exertion of the will might be able to set certain muscles in action ; in other words, that voluntary motion, although seemingly in abeyance, is not absolutely lost. The same patient tells you that he " can feel well," yet very probably, if you try accurate tests, such as the compasses,* or drawing a hair or a feather over the surface, you will find that his sensory function is very far from perfect. On account of our frequent neglect of such tests we are compelled to receive with much qualification, recorded statements as to " perfect sensation " being retained after these accidents.

In making a diagnosis, in the first instance, loss of sensation is of

* The æsthesiometer, devised, I believe, by Dr. Sieveking.

much more value than loss of motion, for the obvious reason that the latter may be only apparent. I will venture one hint as regards the diagnosis of fracture from cases of concussion of the spine. It is this, examine the lower extremities carefully as regards sensation, and if you find that at any parts sensation is utterly lost, so that you can thrust pins into the skin, rest assured that there is more than mere concussion. It may be laceration of nerve-trunks, or it may be a crush of the cord, or of part of it, but there is certainly some structural lesion. I am not much of a believer in severe symptoms resulting from mere concussion of the spine, but I feel sure that it never produces absolute paralysis of any part, however small.

You will find every now and then that the paraplegic symptoms, incomplete at first, increase during the few days immediately following the accident. This occurred in a man (S. Moore) under care about a year ago. I do not know from *post-mortem* examination, what the change is which causes this increase of symptoms, but judging from clinical evidence, I should infer that it is not of a serious nature. I have several cases in memory, in which, after injuries either to the cord or the brain, motor paralysis, which either did not exist at first or only imperfectly, increased and became complete, soon afterwards, and all of them recovered perfectly. The prognosis is certainly very much better than when the paralysis is present from the first.

The presence of a hyper-æsthetic boundary tract, between the paralyzed and non-paralyzed tracts of integument, is often a marked symptom. On this boundary-tract any slight irritation produces not normal sensation, but intense pain. The explanation no doubt is that the sensory nerves, supplying this portion, run into portions of the cord which are not absolutely disorganized, but only contused, and irritated by the damage sustained.

I must leave the subject of the peculiarities of respiration, etc., which ensue after fracture in the cervical region, for another time. After a few words on *prognosis* and on *treatment*, I must hasten to conclude.

It is obvious that the *prognosis* will depend upon your estimate of two factors. First, the position of the injury, and, secondly, the extent to which the cord has been damaged. First, then, are the cases in which the existence of complete paraplegia below the seat of injury,

indicates that the cord has been most severely damaged. In these the danger to life increases in proportion as we ascend towards the medulla. Many, perhaps most, of the fractures in the lumbar and lower dorsal regions, might recover if it were possible to avoid cystitis and bed-sores. There is nothing necessarily fatal in complete and permanent paralysis of the lower extremities and of the sphincters. But, in these cases, you may hope for a better result than this. In not a few cases the paraplegia will disappear, and the patient make a complete recovery. You have but to see to the his careful nursing, place him on a water-bed, and abstain from serious interference.

If the fracture be high enough to implicate the respiratory muscles, a new element of danger from pulmonary congestion, &c., is added, and if it be so high as to paralyze all the thoracic muscles, the prognosis becomes exceedingly grave. But very few such patients recover or even survive many days.

I have been speaking of cases in which one vertebra has been completely displaced from another, and the cord crushed between them, much in the same way that a finger might be crushed by shutting a drawer. There are, however, other cases in which no such complete displacement has occurred, and these will generally be known by the imperfect character of the paralysis. These are, I think, more likely to happen in the cervical region than elsewhere, since they generally result from direct violence, and the neck is more exposed to violence of this kind than other regions. After such an injury, one arm may be paralyzed and the other not, and the muscles of respiration on one side only, and perhaps only imperfectly on that. These cases often recover, in spite of the importance of the region injured, but usually some degree of permanent local paralysis persists.

In justification of the strong opinion which I have already expressed against operations with the intention to elevate depressed portions of bone, I must say a few words more. My chief reason is that by doing so, you convert a simple into a compound fracture, and add the risks of pyæmia, together with those of spinal meningitis. Then, I urge that depressions of bone very rarely exist, perhaps not once in twenty cases, and that it is utterly impossible to select the case. The amount of displacement apparent externally will not help you much, for this may be very great, and may be due to such a twist of an

entire vertebra as it will be quite impossible for you to replace. The irregular form of these bones makes it exceedingly difficult to effect the rectification of a displacement. I must insist that operations for injuries to the spinal column are not to be fairly compared with those on the skull. In the latter region, you have to deal with large smooth superficial surfaces of bone, you can easily appreciate irregularities and easily gain access to them. In the former, the opposite is the fact. Nor, I believe, do clinical results as yet hold out any encouragement to those operations. This latter part of the subject I shall, however, leave for the present.

FUNCTIONS OF THE OPTIC THALAMUS.

By J. HUGHLINGS JACKSON, M.D.

EVERY physician must have been struck with the far greater
number of cases of loss of motion, he meets with, in comparison with
cases of loss of sensation, from disease of the nervous system. Dr.
Handfield Jones, in his recent Lumleian Lectures, says—(I put some
of his words in italics)—" The much greater tendency to impairment
of motor than of sensory power, in almost *all kinds* of nervous diseases,
organic, as well as inorganic, is a remarkable and unexplained fact."
Hemiplegic paralysis especially, is common, but hemiplegic anæsthesia
is very rare. Both, however, occur together from disease of the
same centre of the brain, viz., the optic thalamus, as in the case I am
about to mention.

The case is, by no means, a common one. Effusion of blood in
the thalamus is not at all uncommon, but effusion, nearly limited to
the thalamus, is, in my experience, rare. In many of the *post-mortem*
examinations I have made, in cases of chronic hemiplegia, the clot has
affected both the corpus striatum, and the thalamus opticus. The
case I relate is the only one I can call to mind, in which I have had
an autopsy on a patient who has died some months after an attack of
hemiplegia, in which the *post-mortem* changes have been confined,
or nearly confined, to the thalamus opticus. In this instance,
disease has made a fairly accurate experiment, to shew some points
in the physiology of this important centre. The case has an interest
to me from a narrower point of view, as regards the question of the
condition of sensation in the common form of hemiplegia.

In a lecture (*London Hospital Reports*, Vol. ii., p. 303), I considered hemiplegia from disease of the corpus striatum, and hemiplegia from disease of the optic thalamus, as one symptom. These two ganglia are often affected together, and lesion of either of them alone seems to produce pretty much the same form of hemiplegia. Dr. Todd says : " It is remarkable that lesion of the optic thalamus should produce, nearly or precisely, the same effects as lesion of the corpus striatum." For fear of being misunderstood, it may be well to say that hemiplegia, from disease of the pons Varolii, is not here in question.

Considering the common form of hemiplegia then, from its clinical point of view, as an affection of either the corpus striatum, or thalamus, or of both, I was led to conclude that sensation generally escaped in this form of paralysis. I wrote, "There is usually no loss of either common or special sensation. Sometimes, however, sensation is a little—but very little—impaired." But I was careful to add, " on these points I take my knowledge chiefly from *chronic cases,*" and to state further that "many physicians consider that there is decided loss of sensation in this form of hemiplegia."

I still think the facts are pretty much as I then stated them, but I now admit that my knowledge was too much "taken from chronic cases," and was therefore one-sided. I think sensation is *more* often, and *more* considerably affected in hemiplegia than I used to think it to be.

During the last few years I have seen, at the Hospital for Epilepsy and Paralysis, several hundred patients with hemiplegia, but nearly all of them were chronic cases. In the majority of the hemiplegics at this Hospital, the cause of the paralysis is, doubtless, cerebral hæmorrhage, and we see chiefly those patients who have gone through the immediate effects of so serious an accident, and who come for the relics of a disease. The cases of recent hemiplegia I have seen at the London Hospital, and especially when I delivered the lectures referred to are, in comparison, few.

I knew that, according to physiologists, there ought to be loss of sensation in disease of the optic thalamus, but as I had very rarely found anæsthesia with hemiplegia, I thought medical physiology did not strictly harmonize with the conclusions of pure physiologists. Dr. Broadbent has, in a very remarkable and most important paper on

Hemiplegia* (*Med.-Chir. Review*, April, 1866), offered an explanation of this apparent discrepancy. Besides this, Dr. Broadbent has added much to the observations which have been made on the symptoms, both motor and sensory, of hemiplegia.

In cases of hemiplegia, loss of sensation is known to be more rapidly recovered from than paralysis of motion. For instance, Dr. Todd, in the general consideration of paralysis of motion and sensation, writes, "Sometimes at the commencement of an attack they will be conjoined, but the paralysis of sensation usually disappears speedily, leaving only the paralysis of motion." The absence of anæsthesia, in chronic cases of hemiplegia, ought not, therefore, to be taken as proof that the centre diseased is not sensory as well as motor.

Dr. Alexander Robertson has published a very valuable paper on "Brain Disease," in the *Glasgow Medical Journal*, August, 1866, from which I make the following extract. The observations of this physician are, I think, worthy of the most careful consideration.

"During the last year I carefully noted the symptoms in forty cases of hemiplegia due to organic changes in the brain, mostly of a hæmorrhagic kind; and many of the patients are still resident in the Town's Hospital. In these cases the duration of the paralysis ranged from a few days to many years. On referring to my note-book, I find that at the time of the examination, sensibility was defective on the affected side of the face in no less than fourteen instances; two were hyper-sensitive, one had been overlooked, and in the remaining twenty-three its condition was normal, although not improbably, from the fact to which I have referred, viz., the frequent rapid restoration of the sensory function, an impairment may have existed in some instances when the palsy occurred."

"With the view," Dr. Robertson adds in a footnote, "of corroborating my opinion on this point, my friend, Dr. Russell, physician to the special Fever Hospital of this city, who is well known to be a careful

---

* I may also mention that this paper contains a most valuable hypothesis to explain the escape of the muscles of the trunk, in cases of the common form of hemiplegia. I know of no facts which seem to contradict Dr. Broadbent's views on this subject, and I believe I can shew, by the phenomena of some cases of epilepsy, that they are correct. I suppose, however, that nearly all who are interested in the study of the Nervous System will have read Dr. Broadbent's paper. If any of my readers have not, they will thank me for drawing their attention to it.

and accurate observer of disease, was good enough, at my request, to test the sensibility of the face in two cases of ordinary hemiplegia of some years' standing, at present under treatment. After a careful examination, he expressed himself as quite satisfied of the correctness of the observation, that the sensory function was distinctly impaired."

Dr. Broadbent thinks that just as after an experimental injury, a bridge of grey matter in the cord will conduct sensitive impressions, so, in injury by disease, to the higher part of the motor and sensory tract—the optic thalamus—lateral conduction may become sufficient, even when part of the structure of this centre is actually destroyed. When a great deal is broken up, of course restoration of sensation can only be partial.

I now speak, in illustration of the above, of a case I have related at the end of my lecture on " Cerebral Hæmorrhage. The symptoms were very like those in the case Dr. Broadbent related in his paper at the Medical Society of London, December, 1865 (since published in the *Med.-Chir. Review*), and the degree of loss of sensation · was so unusually great, according to my experience of chronic cases of hemiplegia, and I diagnosed ´disease limited to the optic thalamus with much confidence. I had carefully ascertained during the patient's life that—as Dr. Broadbent said was the case with his patient—sensation was impaired in the region of all the sensory branches of the fifth nerve, which supply the skin, and also in one-half of the trunk as well as in the arm and leg.

Sensation was not lost, nor was it so much impaired, but that pinching was painful. There was, moreover, a slight, but decided, wasting of the muscles of the paralyzed arm, chiefly of the extensors.

The disease was not strictly limited to the thalamus. At the autopsy I cut through it from within outwards, beginning at about the line of the posterior commissure. This incision went through the remains of a clot. The diseased part did not extend to within a quarter of an inch of the commissure, nor to within about that distance of the geniculate bodies.

In front of the incision, the quantity of the centre disorganized would be equal to a small hazel-nut. Outwards the disease extended through the small tongue of corpus striatum, which curves round the outside of the thalamus, and thence up to the grey matter of the convolutions of the Sylvian fissure.

In making the autopsy I had the advantage of the assistance of Dr. Richardson, of the Caledonian Road, Mr. Powell, of Amwell Street, and Mr. Ansell.

Now as regards the patient's sight it was not much impaired, when, some months after the attack of hemiplegia, I first saw him. It failed gradually. I found, however, the retinal degeneration attending Bright's-disease, so that the condition of his sight would have no direct bearing; it could not be precise evidence at least, on an investigation of the functions of the optic thalamus. With the failure of sight, were corresponding appearances in the retina. The case shews, however, that without an ophthmalmoscopic examination, false conclusions might be arrived at as regards the cause of defect of vision ; when, after death, we find disease of the *optic* thalamus. On these points I have already spoken in the *Ophthalmic Review*, April, 1866.

The clinical history and the autopsy contain points of greater medical interest even than those relating to the physiological questions of the functious of the thalamus, but I have already entered into their consideration. I may briefly note one other point.

It is well-known, that in disease of the higher parts of the motor tract, the nerve-fibres waste below. Thus I have the medulla oblongata of a woman, who had died two years after hemorrhage into the corpus striatum and thalamus opticus.

The corresponding anterior pyramid is much wasted. It seems to consist of little else than connective-tissue. I have, unfortunately, not got that patient's spinal cord. In the case I have just related, I think it possible that I may trace degenerative changes in the cord, which may give us some hints as to the course and relation of those sensory nerve-fibres which go from the limbs, &c., to the thalamus.

NOTES ON SYPHILIS.

By JONATHAN HUTCHINSON, F.R.C.S.

Relapsing indurated chancre.

I AM sure that it is not a very infrequent occurrence for indurated chancres to relapse without any fresh contagion. Thus year after year the soft scar of a former induration may suddenly again inflame, become hard, and even ulcerated. I have seen, I think, at least a dozen remarkable examples of this. Often the relapsed induration is so like that of a primary chancre, that it is impossible to distinguish it excepting by the patient's history. Several of my patients have been young medical men, who were able, therefore, to give a very reliable and accurate account of the course of their symptoms. In one case, I had the same man three times under care at the Hospital with a relapsed induration, and, in another, a man came four times in as many years with the same. In each instance the fresh sore was in the scar of the former ones. A few weeks ago, I saw in consultation with Mr. W. Allingham, a lady who suffered from a tertiary affection, and in whom, Mr. Allingham told me, this relapse of the original chancre had repeatedly occured, always exactly in the site of the first one. In many instances sexual intercourse (without inoculation) appears to be the exciting cause of the relapse. Relapses are more common within a year or two of the original sore, but I am convinced that they occur even many years after it.

Relapse, long after a sore has soundly healed, may become of much importance in practice. Mr. W. D. Michell brought to me a gentleman, in whom the relapse had occurred under very painful circumstances. Having been treated for a soft sore in July, 1864, he married fifteen months later, and within three weeks, the sore re-

opened and became hard. When I saw him, he had a disc of decided induration in the prepuce, close to the corona. He said that it was exactly in the site of the former sore. In this instance, it was believed that the original sore had never indurated, nor had it been followed by any marked constitutional symptoms. He had also had a chancre six years previously. On each occasion the chancre was attended by enlarged glands, which did not suppurate. He had never taken mercury.

A long course of iodide of potassium.

Mr. W., whom I have repeatedly seen during the last three years in consultation with a very able surgeon, whose patient he is, has taken iodide of potassium during the whole period. He suffers from tertiary syphilis, and has lost large portions of bone from the nose. He was first brought to me more than three years ago, with profuse fœtid ozœna. We ordered the iodide in seven-grain doses three times daily. He found great benefit from it, and improved not only in the local condition, but in general health. Whenever he left off the remedy he relapsed. At the present time he assures me that he has for nearly three years taken the dose mentioned quite regularly. Mr. W. is married, and the father of a family of healthy children, the youngest now a few months old. He is florid, stout, vigorous, and in excellent health. His ozœna is now well with the exception of a slight discharge when he takes cold, and I think that all the diseased bone has been got away. He is decidedly unwilling to leave off the medicine.

I have often given the iodide in very long courses, but I think rarely with such steady perseverance as in the above case. When once a patient gets used to it, we never, I think, witness any ill results. It very often disagrees in the onset, and not at all afterwards.

Syphilitic enlargements of bone simulating cancer.

Very large nodes of long bones—of the femur, or humerus, especially—not unfrequently simulate the characters of malignant disease. A remarkable instance of this was under my care at the Metropolitan Free Hospital eight or nine years ago. A married and very respectable-looking woman of middle age, had a general enlargment of the lower third of the left femur. The soft parts were

thickened and the whole constituted a very large tumour, the limb measuring several inches more in girth than its fellow. There had been great pain in the swelling, and the patient was sallow and cachectic. She had no other syphilitic symptoms; but at a subsequent visit when, having by the administration of iodide of potassium confirmed my suspicions, I put the question, she admitted that fifteen years ago she had contracted the disease. This was before her marriage, and whilst she was living at an hotel.

We admitted this summer a woman with a tumour on the middle of her right femur, which, I believe, everyone who examined it at first took for cancer. My own diagnosis in the admission-room was in that direction, The woman was aged 34, of a yellow faded-leaf complexion, very much emaciated. The middle third of her femur was involved in a general ovoid enlargement, and at the thickest part, was as thick as a fist. When I examined her more carefully in bed, my suspicions were aroused by its even surface, and by the history of nocturnal exacerbations of pain. On pursuing this train, and asking direct questions, we could not obtain any history of syphilis. There were, however, some very suspicious scars of former ulcerations on the leg. She was an American, and had married at the age of 15. The sores on her leg showed themselves within a few years of her marriage. She never had any children. Still it was very possible that cancer might have occurred in a syphilitic patient. We used the iodide of potassium freely and with the best results. Her pain ceased, the swelling diminishing in size, and after two months' treatment she left the Hospital at her own request, considering herself cured.

Nodes of the femur.

I believe there is a general impression entertained, that the femur is rarely affected by syphilitic periostitis. It happens, however, that we have a remarkably good series of specimens of nodes of the femur in our Museum. Most of them are without any life-history, but from the character of the sub-periosteal deposit, there can, I think, be no doubt that they are the results of syphilis. I have not myself seen many examples of nodes of the femur in patients who were the subjects of tertiary taint from acquired disease; but I have repeatedly seen such from the inherited form. Very probably some of our Museum specimens are from heredito-syphilitic subjects.

Spontaneous fracture in a node of the humerus.—Union after several months.

At the time that the woman, whose case I have mentioned above, was under care, we had in Talbot ward a yet more remarkable and puzzling case. This patient, a sailor, of about 30, was transferred to me by Dr. Parker, having been admitted on the medical side with dysentery and rheumatism. He had but just landed from a voyage. There was a large irregular tumour, evidently bony in parts, about the middle and lower third of his right humerus, and in the middle of this spontaneous fracture had occurred.

The fragments of bone were quite loose, and grated on each other very freely. Although we had a clear history ot syphilis, yet I could feel but little doubt that this tumour was a malignant one. On the inner sides of both femurs, just above the knee-joints, were large periosteal indurations, smooth on their surfaces, and very like nodes.

At first I treated this man by iodide of potassium; but his dysentery was so urgent that I was obliged to suspend this, and after trial of various remedies we eventually cured the latter by full doses (a scruple) of the tris-nitrate of bismuth with opium.

When his diarrhœa ceased he began to improve in health. He had no pain in the arm, and in spite of the free movement at the fracture, he used to employ his hand. At length, we found that the swelling was getting a little less, and the movement not quite so free. The final result was that the fracture united firmly, and that a large part of the new deposit about it was absorbed. The man left the Hospital in greatly improved health. The nodes on his femurs were much as at first.

We can scarcely, with the result before us, entertain any doubt that this was a case of syphilitic disease of bone, and not of carcinoma. Yet I never before knew spontaneous fracture at the seat of a node occur, excepting in a young infant. Nor have I ever known a case of node with so much of irregular outgrowth about it as was present here. So certain did I feel that it was cancer when I first saw the man, and for some weeks afterwards, that, had it not been for the existence of the disease of the femurs also, and for the bad state of the man's health, I should certainly have advised amputation. It should be added that he had not had scurvy.

Death from myo-carditis in the course of secondary syphilis.

In April last my friend, Dr. Wilkinson, of Old Broad Street, sent to me a young man who had been for some months under his care, and who, in consequence of family affairs, was now anxious to come into the Hospital. I admitted him, but saw him only once, and then hurriedly. Observing that he had several syphilitic ulcerations about his legs, and was very cachectic, I ordered him iodide of potassium and ammonia, and did not investigate his case so thoroughly as I ought to have done. At the time of my visit he was sitting up in bed looking much distressed and very pale. He answered my questions in a peevish manner, and seemed very restless, and thinking that something had annoyed him, I did not press my examination. I learnt afterwards that his peculiarity of manner had struck others who saw him, and led to a suspicion that he was going insane. On the second night after I saw him, the House-surgeon was hastily called to him by the nurse, and found him dead. The nurse and patients reported that he had appeared to be very restless until within a very short time of his death.

The *post-mortem* examination was made by Dr. Hughlings Jackson the next day. No evidence of disease was detected, excepting in the heart. On the surface of this organ, beneath the pericardium, were numerous patches of ecchymosis, and on making section of the muscular substance it was found to be extensively inflamed. The patches involved were large, and included, indeed, the greater part of both ventricles, especially of the left. These patches were tolerably well-defined, and much paler in colour than the rest, being of a yellowish-grey colour. They were not materially softened, but here and there ecchymoses were seen. Under the microscope, cells, closely resembling those of pus, were found between the muscular fibres, and there were also numerous oil-globules. There was no lymph in the pericardium, nor any disease of the valves.

I ascertained afterwards from Dr. Wilkinson the following details, as to this man's illness:—He had contracted primary syphilis about a year before, and had been irregularly under treatment. In November he had a severe attack of erysipelas, and was delirious. During January, February, and March, Dr. Wilkinson treated him at different times by mercurial inunction for a relapsing syphilitic

rash. Of this a few unhealed ulcers about the legs were all that remained, but he had latterly lost flesh and became very feeble. For a few days before his admission into the Hospital he had been very restless and rarely able to sleep. He had throughout never been salivated.

Anti-mercurialists will probably incline to attribute the myocarditis which caused death to the drug rather than to the syphilis. Whether it had or not any relation to either, must remain for the present uncertain.

Nodes in muscle resembling cancerous growths.

I have had recently several remarkable cases illustrating the importance, and, at the same time, the difficulty of diagnosis between syphilitic muscular nodes and malignant growths. Mrs. P. was sent to me by my friend Dr. H. Weber, on account of a large, ill-defined, growing mass in the substance of the left cheek. We both thought that it was malignant, and the propriety of an operation was discussed. Finding, however, that it seemed to be in connection with the masseter muscle a suspicion crossed our minds, and we determined at any rate, in the first instance, to try iodide of potassium; I should say that the lady appeared to be in good health, and that she had a grown-up and healthy family. There did not seem the slightest reason for suspecting that she had suffered from syphilis, and there were manifest ones against asking any direct questions. The questions we did ask, however, aroused her suspicions, and on her third visit to me she, with expressions of great distress, told me voluntarily her story. Fifteen years ago, and after the birth of her living family, she contracted syphilis from her husband and suffered severely. Several children born after this died. Having obtained this clear history, we increased the dose of iodide to fifteen grains, and the tumour, which had at first been as large as a child's fist, melted away as if by magic. In about a month all trace of it had disappeared.

A few weeks after the case just recorded, Mr. J. F. Streatfield sent to me a cachectic woman who had a large nodulated tumour in the right cheek. It was firm in parts, doughy in others, and attached at its base to the masseter. There was no inflammation about it, and the general suspicion was that it was cancerous. I admitted her at the London Hospital, and finding that she had lost

one eye by iritis, my suspicion that it was a syphilitic node became almost a certainty. I remarked to the students that they should now have a demonstration of what iodide of potassium could do. We ordered ten grains, with half a drachm of sal volatile, three times a day. In a few days the tumour was much smaller, and in the course of a month it was gone. The woman had also greatly improved in general health. A few months later she again came under my care for a small induration in the site of the former one, which again yielded to the iodide. At present she is for a third time under care, on account of a lump in her tongue of precisely the same character as those which I shall describe in the following case, and which will, I have no doubt, again yield to the specific.

Mrs. L., aged 63, a pallid cachectic-looking woman, applied on January 1st, 1860, on account of two hard lumps in her tongue. One of the lumps was about the size of a cherry, and was near the tip on the right side, involving the entire thickness of the organ. The other was situated in the under part on the same side, and was as large as two almond kernels merged together. Both were well-defined and isolated, the adjacent and intervening tissues being soft and quite healthy. There was no ulceration whatever on the surface of either, but on the upper aspect of the smaller was a white appearance, as if the mucous membrane were on the point of giving way. Both adhered to the mucous membrane, beneath which they lay. My first thought was, judging from their hardness, their isolation, their position, the woman's age and appearance, that they must be carcinomatous. Against such a diagnosis, however, was the fact that there were two, and that they were quite distinct from each other. The woman told me, on questioning, that they had been forming for about a month, and that excepting a little heat and pricking, they had caused no pain. About four years ago she had, she said, been under Mr. Critchett's care at the London Hospital for a similar state of things. At that time there was no lump under the tongue, but the hardness, etc., of the swelling in the upper part was, she felt certain, quite equal to what was now present. She took medicine for many months before the lump "melted away," but at length she got quite rid of it. This history pointed to syphilis, but then we usually see syphilitic tongues fissured and corrugated, and displaying white markings, etc., whereas, in this instance, with the excep-

tion of the lumps, the whole texture of the organ was soft and perfectly free from morbid alteration.

On putting to her the question as to specific disease, she told me that she had been a widow sixteen years, and that, four years before his death, her husband had brought her home "the disease," from which she "suffered fearfully, and, indeed, almost died." She stated that the sores of the genitals were followed by rash, and severe inflammation of both eyes. She was salivated several times. After that, until the time of her tongue being affected, four years ago, she had remained without any special symptoms, although never regaining her former health. At present, she had no other symptom excepting the lumps in the tongue. All her children had been born before she contracted syphilis, and all were living and healthy.

With this history I could no longer feel any doubt as to the nature of the disease, and prescribed accordingly full doses of iodide of potassium with the usual most satisfactory result.

Cancer of the tongue following syphilitic sores.

It is in the case of the tongue that the most difficult cases as to diagnosis occur. I have recently seen several, in consultation, in which it was impossible to feel certain, previous to the trial of the iodide, with which disease we had to deal, or whether with both together. In the case of the tongue, the clear diagnosis of syphilis by no means removes the suspicion as to cancer, for it is not unfrequent for syphilitic sores to pass into cancer. In a patient under the care of Dr. Rose, of Mile End, whom I am at present seeing occasionally, this difficulty occurred. The man was undoubtedly syphilitic, and had numerous syphilitic fissures in his tongue, but there was one hard-based ulcer which I thought had become carcinomatous. It did not yield to the iodide, and I advised him accordingly to lose no time, but, at once to have it removed by ligature, which was accordingly done. A few years ago, a gentleman was sent to me by Dr. Peacock for a cancerous sore in his tongue. There was no doubt that the original disease of the tongue was syphilitic, for he had for ten years been, at different times, under the treatment of Mr. Startin, Mr. Coulson, and Dr. Peacock, all of whom had given the same opinion. There was equally little doubt that the final disease was cancer, for although he made an excel-

c c

lent recovery after extirpation of two-thirds of the organ, and the scar remained sound, yet he died a year or fifteen months later from cancer of the glands of the neck.   When indurated ulcers in the tongue resist the influence of full doses of iodide of potassium, they should be viewed with the utmost suspicion, no matter how clear the diagnosis of syphilis may be.   If cancerous action has commenced, there is no time to be lost.

DETACHED NOTES ON

SYMPTOMS, DEFINITIONS AND DIAGNOSIS.

By JONATHAN HUTCHINSON, F.R.C.S.

———————

But few of the following detached notes have much claim to originality. They have been penned solely in the hope of putting certain somewhat difficult points in a clearer light, and they have been written chiefly for students. Some of them are directed against what I believe to be errors in doctrine, or in the definition of terms, which are to be found in some of our best systematic works. In the latter instance I have carefully avoided mentioning names. That the notes may be found useful, is my only ambition in publishing them :—

I.

The phenomenon of rigor is probably dependent directly upon spasm of the arteries (excited, of course, through the vaso-mortor nerve).* By this spasm the due supply of arterial blood to the surface, to the muscles, and to the brain, is prevented. It is quite possible to have partial rigors as well as complete ones.

II.

During a rigor as, for instance, a pyæmic rigor, the pupils become widely dilated, just as they do during epilepsy.

III.

A widely dilated pupil is indicative of spasm of the radiating

* See Dr. Brown-Sequard's Lectures.

fibres of the iris ; these fibres being under the control of the vaso-motor nerve. Very often there is also paralysis of the circular fibres (third nerve).

In the cold stage of cholera the pupils are not dilated, but of normal size. I therefore infer that there is no arterial or vaso-motor spasm in this stage, and that the hypothesis of those who consider it analogous to the cold stage of ague, is not well founded.

IV.

A motionless pupil, of rather less than usual size, and quite unable to dilate when shaded, is characteristic of paralysis of the radiating fibres of the iris. It is met with in connection with aneurisms and other tumours in the neck, and with direct injuries to the cervical cord, or to the trunk of the sympathetic ; now and then, but very rarely, it occurs as the only symptom present, and without apparent cause.*

V.

In hydrophobia the patient is very-pale, the skin cool, and the pupils widely dilated, or, at any rate, this condition occurs in one stage. These conditions indicate general spasm of the vaso-motor nerve. Such spasm would account for the sleeplessness and terrible fear.

VI.

Erysipelas is clearly not an exanthem.† It is not symmetrical in its manifestations ; one attack does not prevent another ; it does not observe stages ; and, lastly, the constitutional disturbance is pro-duced by the local inflammation, and is proportionate to its extent. To call such a disease an exanthem, because it is attended by redness of the skin, is to be guilty of a generalisation almost as hasty as that of the man who saw a donkey for the first time, and exclaimed that he had "found the father of all the rabbits."

VIII.

We are not as yet in a position to classify skin-diseases ; but we

* See *Ophthalmic Hospital Journal*, April, 1866, p. 136.

† See an able paper by Mr. Higginbotham of Nottingham, asserting the same doctrine which I advocate. *British Med. Journal*, Jan. 7th, 1865.

can group them, or rather we can group some of them, and with much convenience to the learner, and to the prescriber.

One natural group of skin-diseases should comprise those which are constitutional, and as a result symmetrical, and which are liable to relapse. This group should include psoriasis, pemphigus, some forms of lichen, and many of eczema. I should exclude those forms of lichen and eczema, which are in connection with local causes, and take only those which are constitutional. All in this group agree in the circumstance, that they are remarkably under the curative influence of arsenic; which fact proves their mutual relationship yet more closely.

IX.

Another natural group of skin-diseases would comprise those caused by vegetable growths—the true Tineæ. This group, in English practice, would take in Favus, Tinea tonsurans (true ringworm), whether on the scalp or on a bare surface; pityriasis versicolor, and possibly alopœcia areata. All are contagious, and all are curable more or less readily by local treatment alone. None of them are altered by constitutional measures, however long persevered in. None of them begin in old persons, and several of them occur only in the young.

X.

It is probable, though not yet proved, that the fungus, which produces the parasitic diseases of the skin, is the same in all, though developed in very different forms.

XI.

Sycosis, as met with in English practice, is, I believe, not cryptogamic in origin, but an inflammation of the hair-follicles more or less allied to acne, and to some forms of lupus. Its cause may differ in different cases. Its cure should be by local and constitutional measures combined. Will some one of the several British dermatologists, who advocate its cryptogamic origin prove the fact by a demonstration before the Pathological Society?

XII.

The contagious element in skin-diseases may be introduced from

several different sources. We have contagion by animal parasites, by vegetable parasites, next, and most important, by pus itself, and, lastly, infection or aërial contagion. Infection produces a blood-disease, and an exanthem as the result,—all the others produce local inflammations. The doctrine of contagion by pus I hold to be most important ; it is not only that specific pus is capable of communication by contagion, as gonorrhœal or syphilitic, but all pus, under certain conditions favouring inoculation, may produce its like —may originate a suppurative inflammation of the surface to which it is applied.

XIII.

Common pustular acne is almost always symptomatic of other disorder. In 50 per cent. I should suppose that it is in connection with the generative functions, and in the rest with disorder of digestion. It is extraordinary how very slight may be the disturbance of the sexual function, which may induce inflammation of the follicles of the face. I have known a lady in whom a few acne pustules appeared regularly at each menstrual period. In men, I have been made acquainted with the facts of several cases in which a crop of fresh acne would often occur in connection either with unusual sexual indulgence, or with a succession of nocturnal emissions. I was assured by one gentleman that fresh pustules would often follow within twenty-four or forty-eight hours of the latter occurrence. In such cases it is clear that the inflammation of the follicles of the face is caused through the nervous system by reflected influence. It is impossible that any blood change could occur to account for it.

It is, however, only in some skins that acne can be produced by sexual causes, and when it does occur in such connection, it by no means implies a state of extreme debility. I have repeatedly seen instances of extreme exhaustion produced by sexual abuses, in which no acne had occurred. On the other hand, many celibates who have suffered from " sexual acne," lose it entirely on marriage, and at the same time much improve in general health.

XIV.

The commonest skin-disease which we have to treat in children, is what, following Mr. Startin's nosology, I am accustomed to call

"Porrigo." By most authors it is considered to be a form of eczema. I prefer, however, to distinguish it from the latter for the convenience of practice, fully admitting that there is no definite boundary-line between the two. Porrigo is very contagious ; eczema, but rarely so. Eczema is usually constitutional, and to be cured only by internal remedies. Porrigo may be cured in a week, whilst eczema takes months.

The cases, which at the Skin Hospital we call porrigo, are characterized by the large amount of crust which is effused ; a thick, heaped-up, purulent scab, often of a greenish aspect, or like honey. The crust covers the inflamed area; and there is little or no thickening of the skin ; the effusion is quite superficial. Its commonest seat is the occiput, but it may affect any part of the scalp, or the face, or the skin generally; the lymphatic glands almost always enlarge, but they very rarely suppurate. The secreted matter is very contagious, and fresh spots come out wherever, by scratching, inoculation is effected. It is contagious to other parts of the patient's skin or to other persons, whether young or old. It often causes whitlows about the nails of those who attend to the child. It may occur in those who are in excellent health, and no internal medication that I am acquainted with will cure it. On the contrary, it may be quickly cured by local means. The nurse must be instructed to clean away every portion of scab, and then to apply to the sores an ointment containing some preparation of mercury or lead. One which I usually employ is fifteen grains of the ammonio-chloride to an ounce of lard, or another, nearly equally efficient, is a drachm of carbonate of lead to the same. A week or ten days ought to suffice for the cure, and if it does not the fault usually rests with the nurse.

I think that we should greatly facilitate the successful study of dermatology if it were agreed to call this disease " common contagious porrigo " instead of associating it with eczema.

xv.

In cases of fracture of the spine and resulting paraplegia, the patient should, from the very first, be put on a water-bed. There is no fear of redisplacement. The catheter should be avoided if the urine will run away.

XVI.

I have not chanced to meet with any correct description of all that occurs in diaphragmatic respiration.   When all the respiratory muscles, excepting the diaphragm, are paralyzed, the thorax, instead of being merely *hors de combat*, actually counteracts the efforts of the diaphragm. In normal breathing, of course the thorax expands, when the diaphragm sinks, and thus, by co-ordinated effort, the capacity of the chest is increased in all diameters.   When the thoracic muscles are paralyzed, the walls of the chest do not remain motionless, but they sink and rise under atmospheric pressure at precisely the wrong times.   When the diaphragm contracts and the chest-wall ought to be lifted, it sinks, and when the diaphragm relaxes, the chest-wall is driven up with a sort of thud, very sudden and very peculiar. This kind of breathing is so remarkable, that I have sometimes recognised it immediately in going to a patient's bedside, and before his chest was exposed.   Diaphragmatic breathing is rarely quite regular, and often it is very uneven.   I thought at one time that it might be well to fix the chest-wall mechanically, but in practice it did not succeed.

XVII.

Thoracic respiration, in paralysis of the diaphragm, is also very peculiar.   The diaphragm does not remain motionless, but moves up and down, counteracting the efforts of the chest-wall to draw air in through the throat.   The belly sinks when the chest rises, and rises when the chest sinks. I have seen but one good example of paralysis of the diaphragm, but in it we watched the breathing carefully for upwards of half-an-hour, and I demonstrated its peculiarities to those present. The man was dying of hæmorrhage into the ventricles ; and at the autopsy we found both lateral ventricles, and also the third and fourth, stuffed full of blood-clots.   The clot in the fourth was nearly as large as one's thumb, and no doubt this was the cause of the phrenic-paralysis.

XVIII.

One-sided fur on the tongue is, I believe, caused simply by the circumstance, that its subject is accustomed to eat on only one side

of his mouth. It is a common symptom, and I have often astonished patients by remarking, "I see you eat only on the left (or right) side of your mouth." The reply invariably confirms the inference. It is often present where there is mere loss of teeth, no toothache, or source of irritation. I therefore cannot agree with the hypothesis, which supposes it to depend upon reflex disturbance of nutrition through the lower branch of the fifth. It is quite true that it occurs in its most exaggerated form when there is toothache, but this is precisely the condition in which mastication on the affected side would be most sedulously avoided.

XIX.

Intolerance of light has in many, if not most, instances, nothing to do with the retina or the optic nerve. It is not met with in retinitis or optic neuritis, and it is met with, in its most intense form, in inflammations of the superficial parts. Its most common cause is ulceration of the cornea. The fifth nerve is the one chiefly concerned in its production.

XX.

A patient who had been for more than a year quite blind, owing to white atrophy of the optic nerves, consequent on syphilitic disease, became the subject of acute corneal inflammation. Before the latter occurrence he could look at the sun without the least annoyance, having no perception of light whatever. During the inflammation of the cornea he had the most intense intolerance of light.

XXI.

In many patients suffering from photophobia, if you lift the lids forcibly, violent seeezing will occur: another proof that the fifth nerve is the one concerned.

XXII.

Year by year we shall come to believe more and more in reflex inflammations and reflex causes of inflammation. What is called " sympathetic ophthalmitis," furnishes us with the most unquestionable example of this occurrence. In these cases, a wound involving the ciliary region of one eye, sets up inflammation in the other.

Often the reflex inflammation is very rapidly destructive. The influence is probably conveyed through the fifth nerve. Injuries to the retina, or injuries to the optic nerve, or to any part of the eye-ball at a distance from the ciliary region, very rarely cause it.

XXIII.

We have, during the past year, had one rather remarkable instance of primary union of a deep and large wound. It was, after an operation for inguinal hernia, reduced *en masse*,* in which an unusually free dissection was required. The whole of the wound stuck together. There was not a trace of redness at its edges, nor was a drop of pus formed. In this instance the man was put under the influence of mercury, and an ice-bladder was kept over the part, some layers of dry lint intervening.

XXIV.

Although "sympathetic" ophthalmitis is perhaps the best instance of a reflected disturbance of nutrition, that we can cite, yet, no doubt, we have thousands of examples of the same process, though under less definite circumstances. Wet feet may cause sore-throat ; a draught of cold air on the back may induce pleurisy or pneumonia ; the introduction of a catheter into the urethra may cause herpes on the lips ; a nocturnal emission may produce inflammation of the follicles of the face (acne).

XXV.

The curative power of blisters is probably due far more to reflex influence, than to any effect on the blood. The quantity of serum drawn off is often trivial in proportion to the benefit produced, and many forms of counter-irritation do immense good without abstracting anything whatever. Must we not believe that it is through the vaso-motor and trophic nerves that these results are induced ?

XXVI.

It may easily be the fact, that there are correlated parts in reference to reflex disturbances of nutrition and reflex cures. Thus the two eyes appear to be correlated. It may be that behind the ear is

* " *Reductio ad absurdum*," as one of the students called it.

the very best position at which to apply a blister for the relief of inflammation of the cornea, and that for every local inflammation there is some special tract of skin where a blister would produce a better effect than at any other part.*

XXVII.

Inguinal hernia in a young female child.—Mrs. S. brought me her child, a girl two years old, on account of a swelling on the right side of the groin. It was about the size of a large filbert, moveable, and feeling much like an undescended testis. It was difficult to reduce, but on two occasions I completely returned it, thus making the diagnosis of hernia conclusive. It was clearly inguinal. It had been noticed for two months. The child had been observed, after running about the room, to put her hand to the groin, as if in pain there.

XXVIII.

It is absurd to speak of "concussion" and "compression" as contrasted, and wholly different lesions, since, in almost all cases of traumatic compression, concussion must also exist. A man, who has had his head battered till the bones have broken, is likely to have had his brain shaken also. The practical question, is in each case, whether in addition to evidences of general shake of the nervous centres, there is also reason to suspect injury to some special part. The indications of injury to special parts, for the most part, are unsymmetrical symptoms. These unsymmetrical symptoms may be due either to squeeze of some part, or to laceration or contusion of some part; in the later stages, they may also be due to inflammation.

XXIX.

The terms "trophic nerves" and "trophic nervous influence" are used by physiologists in reference to the power which the nervous system exerts upon nutrition. Whether there is any such power, is the first question, and if that is answered in the affirmative, then comes the second, as to which nerves regulate it. Some physiologists

* I owe many invaluable hints, on this and on other subjects, in reference to the nervous system and its pathology, to my friend and colleague Dr. Hughlings Jackson.

hold that a sensory nerve can do nothing but simply transmit a sensation from the surface to a centre, and that a motor nerve can do nothing but transmit an order of the will or other excitement from the centre to a muscle, and that neither one nor the other exert any influence on the nutrition of the parts which they connect. As regards the vaso-motor nerve (*née* " sympathetic ") some hold that it exerts a direct influence on nutrition, others that it only regulates the size of blood-vessels, and thus indirectly controls nutrition by influencing the supply of pabulum.

XXX.

Many clinical facts seem to me to concur in pointing to the sensory nerves as those of most importance in reference to trophic disturbance. At any rate, if it be not the sensory nerve-fibres themselves, it must be some others which travel in close company with them which are the important ones. Paralysis of the cervical vaso-motor nerve, although followed by increased supply of blood, is not productive of inflammation. Nor have we any facts in support of the idea that injuries to motor nerves cause inflammation. On the other hand we find, in reference to sensory nerves, the following facts:—1st. The crop of vesicles, characteristic of herpes zoster, is usually mapped out most accurately by the area of distribution of some sensory nerve.* 2nd. That when a sensory nerve, such as the first division of the fifth, is paralyzed, inflammation often follows (of the eye in the case of the fifth). 3rd. That when certain sensory nerves are irritated (not paralyzed) reflex inflammations often ensue. 4th. That after section of mixed nerves, or of the spinal cord, the parts left without sensation often inflame.

XXXI.

The paralysis of a sensory nerve certainly does not necessarily *cause* inflammation, but it appears to *permit* it. The irritation of a sensory nerve may, however, I think, *cause* inflammation, *e.g.*, herpetic inflammation of the skin.

XXXII.

A little girl, who was attending at the Ophthalmic Hospital, had

* Never by a motor nerve, never by an arterial branch, nor, as far as anatomy yet takes us, by the distribution of the vaso-motor filaments.

an ulcer in each cornea and intense photophobia.   Her mother
assured me that for a fortnight she had never seen her open her eyes·
She kept the lids screwed up and her face held down.   One day she
was out walking with her sister, and keeping her eyes closed, fell
into a hole, and was much frightened.   For six hours after the fright
she kept her eyes wide open, then the photophobia returned with the
same intensity as before.

XXXIII.

It is proved that there is such a disease as inflammation of a tract
of skin, induced by some peculiar state of the nerve which supplies
it with sensation—herpes zoster.   It is proved that inflammation of
the iris may be induced by the same kind of irritation to a nerve as
that just referred to.   Now if the iris may thus be made to inflame,
probably the choroid and other structures of the eye may also be
affected.   Further, we may assert, that although as yet we only know
herpetic inflammations as skin-diseases, it is quite possible that there
may be such diseases as herpetic iritis, herpetic choroiditis, etc., with-
out any eruption in the skin.   I use the term herpetic as designating
the chief peculiarities of herpes zoster; that it is induced by a nerve;
is unilateral, and tends to disappear spontaneously.   It is possible
that what we call herpes zoster, when we see its effects in the skin,
may not unfrequently attack internal organs, pleura, lung, liver, arach-
noid.   We must suppose that any structure receiving nerves is liable
to this form of nerve-induced inflammation.

The term herpes, in skin-diseases, ought, in future, to be strictly
kept to that group of which herpes zoster and herpes labialis are the
types.   To continue to apply it to eruptions on the scalp, and to
cryptogamic diseases, such as herpes iris, herpes tondens, etc., etc.,
is to perpetuate confusion.

XXXIV.

We might perhaps define herpes as an eruption, usually vesicular,
which is induced and localized by nerves, which observes accurate
stages; and is essentially transitory.   It has, as far as we yet know,
two chief varieties, herpes zoster, which is almost always unilateral,
and almost never occurs twice in the same patient, and herpes sym-
ptomatica, which is rarely quite unilateral, which occurs over and

over again in the same patient, and has the peculiarity that it almost
always shews itself near to the middle line of the body, and at one
of the outlets (mouth, nose, penis).

XXXV.

It is a very curious fact, but possibly owing to imperfect observa-
tion, that whilst herpes about the mouth, and nose, and about the
prepuce is common, we have no form of anal herpes.

XXXVI.

Dry or senile gangrene is slow gangrene ; moist gangrene is rapid
gangrene. Thus, from the same cause, the plugging or occlusion of
an artery, either one on the other may follow ; or, in the same case,
some parts may shrivel and dry up, and others may become moist.

Dry gangrene may occur in young persons as well as in old ones,
moist gangrene may, of course, occur in the old as well as the young.
All depends upon the rate of death, whether the part dies with its
juices in it, or whether death takes place slowly enough to allow of
all the fluid elements being removed.

The gangrene of old people is not by any means always dry. I
have had three cases during the past few years, in which very old
people were attacked by gangrene of the toes, and the gangrene being
rapid, was moist and fœtid.

XXXVII.

It is sometimes needful to be very precise in the directions given
to patients. I vouch for the literal truthfulness of the following ; all
being occurred quite recently to myself :—

A little boy had lost one eye from an injury. It was painful, and,
I had reason to believe that a piece of metal was still in it. As
its fellow was irritable, I advised removal of the lost eye-ball, and his
father consented. A week later the father came to me in a state
of great excitement and annoyance, because I had " taken the child's
eye out." " Did I not tell you that I intended to do so, and did
you not give your consent ?" " Yes, but I never thought but what
you would put it back again ! "

A poor woman brought her child for ulcer of the cornea. I
ordered, amongst other things, that the eye should be covered by a

compress of oiled cotton-wool. She apologized at her next visit, that she had been unable to follow out my instructions, " for the child had struggled so, that she really couldn't get the wool well into its eye."

A lady brought me her first-born for a trifling ophthalmia. I prescribed a lotion, and " to touch the lids at bedtime with cold-cream." She told me, when she next came, that she could not get any cold-cream, the London milk was really so poor, she had taken a quart, and set it to stand, but there was no cream worth mentioning. Yet, this lady paid her fees regularly.*

* The limits of human stupidity are sometimes quite indefinite. An old man came a few weeks ago to my senior colleague, Mr. Dixon, at the Ophthalmic Hospital, and complained that he was losing his sight, and could not see to read. " At first," he added, " I thought it might be my glasses; but I rubbed 'em up with a bit of sand paper, and I'm no better ! " He produced them in a state of ground-glass.

DESCRIPTIVE LIST OF THE MORE IMPORTANT
SPECIMENS, CASTS, ETC., ADDED TO THE MUSEUM DURING THE PAST YEAR.

By L. S. LITTLE, Curator of the Museum.

Right bronchus plugged by a bean.

The bean is firmly fixed near the commencement of the right bronchus, having, by its swelling, considerably dilated, and
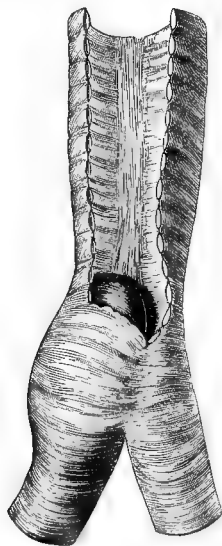
entirely occluded the tube. The calibre of the left bronchus is diminished one-third, as its inner wall is pressed on by the dilated right air-tubes.

This specimen was removed from the body of a boy, aged 14, who, when sucking some beans, suddenly became nearly suffocated.

He arrived at the Hospital an hour after the accident, with urgent dyspnœa.   Inversion was tried, and his breathing ceased.   After tracheotomy and artificial respiration, his breathing was re-established, but the dyspnœa remained.

In an hour's time there was a great amount of emphysema over the chest and abdomen, so much so that the chest was covered with a layer of air three inches thick, and no aid to the diagnosis could be obtained from auscultation or percussion.   Mr. Little now arrived, and passed an elastic catheter, as he thought, into each bronchus, without difficulty.   Six hours later the boy was bled, but without relief, and he died twelve hours after the accident.   After death both lungs were found to contain air, and were apparently healthy.

Detachment of epiphysis of radius, and fracture of shaft of ulna.

The radius and ulna of a young subject, (left arm), removed by primary amputation.   The carpal epiphysis of the radius has been detached.   Almost the whole of the epiphysal cartilage has gone with the epiphysis, but two small patches remain on the extremity of the shaft.   The end of the shaft at its margins is a little splintered, but there is no material fracture.   On the palmar aspect, about a quarter of an inch from the outer border, there is a linear fracture, about an inch long.   The upper end shows the mark of a tooth of a machine, which had entered the bone. This linear fracture does not involve the whole thickness of the bone, and consequently does not permit of motion, possibly it is only a scratch, and if so, the epiphysis was probably pulled off by the teeth which inflicted it.   Unfortunately the carpal end of the bone has not been kept.   The ulna presents a dentated, almost tranverse, fracture, an inch and a-quarter from the extremity of its styloid process.

Obtained and presented by Mr. Dove.   (G. *b. j.* 7.)

Dislocation, traumatic, of the tibia at knee-joint.

A cast, taken an hour after the accident, of a dislocation, at the knee-joint, of the tibia forwards.   The artery was obliterated, and

the nerve also injured. Reduction was easy. The condyles of the femur were one inch below the level of the surface of the tibia. The patella was loose and unsupported.

The cast shows well the increased depth of the joint from before backwards, the prominence of the tibia in front, and of the condyles of the femur backwards. For details of case, see Mr. Hutchinson's lecture in the *Medical Times and Gazette*, 1865. A sketch of the knee by Mr. F. M. Mackenzie has also been preserved.

Occipital encephalocele (of cerebellum).

Cast of the head of an infant, aged two weeks, the subject of encephalocele through the middle of the occipital bone. The tumour is seen to be pedunculated, and is as large as a man's
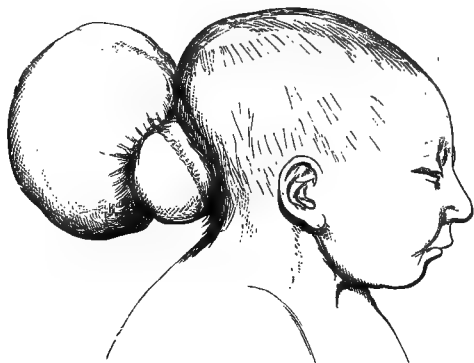
fist, and about half the size of the rest of the child's head. The tumour contained the cerebellum distended into an irregular cyst. See *Transactions of Pathological Society*, for 1865-6.

Presented by Mr. Hutchinson.

Talipes calcaneus, from case of encephalocele.

A cast of the foot and leg from the same child (encephalocele of cerebellum), showing talipes calcaneus. All the muscles were small, but there was no proof of special atrophy of the gastrocnemius, as compared with the extensors.

Dwarfed radius, after separation of epiphysis in childhood.

Cast of the fore-arm and hand of Mrs. ——, showing a dwarfed condition of both ulna and radius, the radius being much the shorter of the two. There was a history of supposed dislocation at the wrist in childhood, but probably a separation of the epiphysis of the radius. The styloid process of the ulna projects, and the hand is pushed over to the radial side. The woman died in consequence of a severe burn. The bones are preserved. Presented by Mr. Hutchinson. (See p. 410.)

Intra-capsular fracture of neck of femur.

The upper third of a right femur removed a few days after the accident. The fracture is irregularly transverse, and about the middle of the cervix. It was wholly intra-capsular, and no portion of it could be exposed till the capsule was opened. In the anterior half of the line of fracture, the periosteal fibres are completely torn through ; in the posterior half, however, they are entire. Thus the only displacement permitted is eversion of the shaft. It is not possible to produce any perceptible shortening. The accident was caused by a wheel passing over the man's pelvis, no doubt crushing the great trochanter outwards. The ilium, on the opposite side, was displaced at the sacro-iliac synchrondrosis.

Obtained and presented by Mr. McCarthy.

Dwarfing of the ulna after injury in childhood.

A stereoscopic photograph of the arm of a gentleman, in whom

the ulna is much shortened, in consequence of an injury in child-

hood.   The subject of the case was sent to Mr. Hutchinson by
Dr. Warwick of Southend.   The ulna is very slender at its lower
part, as well as much shortened.   The hand is pushed over to
the ulnar border by the radius.   The radius is convex on its
outer border, the convexity being probably due to a fracture of
the shaft at junction of middle with lower third.   It is probable
that at the time of the accident, there was fracture of the shaft
of the radius above the epiphysis, and separation of the extremity
of the ulna at its epiphysal line.   Hence the difference, that one
bone has continued to grow, and that the growth of the other has
been arrested.

Presented by Mr. Hutchinson.

Recent fracture of the carpal end of the radius.

The symptoms during life had been those of an ordinary Colles'
fracture, with the addition, that the shaft of the ulna was
broken about two inches and a-half from the wrist.   The radius
is broken across transversely, but with very irregular dentations,
about a third of an inch from its carpal surface, and the carpal
fragment thus detached is splintered into seven or eight por-
tions.   The tip of the styloid process of the ulna is broken off,
and with it goes part of the intra-articular ligament.   The frac-
ture of the ulna is a dentated transverse one, with a longitudinal
split of the proximal portion.

Supra-renal bodies, from a case of morbus Addisonii.

These bodies are about three times their normal size, and
consist of a homogeneous material, resembling tubercular deposit ;
from a young woman admitted into the Hospital with bronzed
skin.   She had frequent fainting fits, and died exhausted.   The
other organs were healthy.   (See p. 183.)

Portions of muscle crammed with encysted trichinæ spirales.

The cysts are large ; exceedingly hard and calcareous.   On
breaking them up, the worms can be turned out entire and
healthy ; none showed signs of vitality under the microscope.

Large salivary calculus.

A salivary calculus of conoidal shape, the size of the top

of a man's thumb, which came away by ulceration from Wharton's duct. It had been preceded, two years ago, by another.

Presented by Dr. Goss.

Cholera discharges.

Microscopic specimens of choleraic discharges, and "first urines."

Tongue excised for cancer.

A tongue removed entire, for epithelial cancer, by Mr. Couper. The excision was performed by making a section through the lower jaw, at its symphysis, and then dissecting backwards, and tying the vessels as they were cut. The patient did well, for the first week, but ultimately died of erysipelas, &c.

Presented by Mr. Couper.

Heart and aneurismal sac; showing a peculiar form of dissecting aneurism of first part of aorta.

This specimen was removed from the body of a man aged 70-80, who was brought to the Hospital dead.

About five-eighths of an inch, above the junction of the right and middle aortic valves, is an oval opening in the posterior wall of aorta; about one and three-eighths of an inch long, and five-eighths of an inch wide; directed obliquely from below, upwards, and from left to right. The right margin of this is smooth and rounded; the upper and left margin is sharp, and looked as though punched out; a small fragment of membrane adhered to it, but could be easily stripped off. This opening leads into a sac, which, when traced, is found to open again into the aorta, by a similar aperture, half-an-inch long, on the left side of left subclavian artery.

The sac is rudely hemispherical, and, when flattened, measures four inches and a-half in diameter, both ways. The anterior wall of the sac is formed by the septum dividing the aorta into two. The lining membrane of the sac is very irregular in character and appearance; immediately behind the aorta, it is tolerably smooth and glistening; on each side of this, it is

obliquely ribbed, and appeared like fine corduroy ; the ribbings are here and there interrupted by irregular, flat, smooth patches, slightly raised above the surface, and pinkish or yellowish-white coloured. Further back, the lining membrane, still smooth, appears to be made up of compressed granulations. Quite posteriorly, the membrane is again smooth and flat, but here and there broken through by projecting laminæ of calcareous matter. On the left side of the sac, near the top, are two transverse columnar bands, connected at their extremities, and free in the middle. The wall of the sac is tolerably uniform in thickness (about one-eighth of an inch thick), elastic, and obviously composed of three layers ; a thin, semi-transparent lining membrane, a tolerably thick, muscular-looking, middle layer, forming the bulk of the thickness ; and itself divisible into two layers : and, lastly, an outer, thin layer, of condensed areolar tissue.

About an inch above the left coronary artery, a minute opening is found, leading into a small cavity between the middle and outer walls of the aorta, and the middle and outer walls of the sac. In this cavity was a soft clot of blood, similar in character to that found in the cavity of the pericardium. About a quarter of an inch above the left flap of the aortic valves, there is a minute triangular opening, like a leech-bite, which leads into the cavity, containing the above-mentioned clot. Another opening was found in the walls of the sac, leading directly from the cavity of the pericardium, into the left coronary artery ; a third opening, a quarter of an inch above, and a little to the left side of the left coronary artery, also led directly into the cavity of the pericardium. No other opening was discovered.

On tracing the aorta upwards, the lining membrane is seen to be flaky and studded at intervals with patches of atheromatous deposit.

The innominate is apparently double, or rather divided into two, by a septum : one half communicated in a direct line with the aorta : the other communicated independently with the aneurismal sac.

Presented by Dr. Andrew Clark.

Calculi removed from the bulbous tract of the urethra.

The following is Mr. Adams's account of this case :—

A man aged 40, came to the Hospital complaining of diffi-
culty in making water. This he had experienced for 26 years.
Whilst preparing to pass a catheter, I felt a hard oval lump in
the urethra when I grasped the penis, and on further examina-
tion I found another lump lower down. I also found that they
rubbed together and gave the impression of stone. This was
confirmed by passing a catheter ; and I, therefore, cut down
upon them just in front of the scrotum, and removed the stones
shewn below :—

I afterwards introduced an elastic catheter into the bladder,
and carefully brought, first, the urethral edges into apposition,
with three small silk sutures, and afterwards, the skin, with
four sutures. The plug of the catheter was left out, and the
urine was allowed to dribble away into a porringer. The patient
died of pyæmia more than a month after the operation.

Presented by Mr. Adams.

Syphilitic growths in the larynx of a child.

Catherine T., aged 2¼, the child of a prostitute, was ad-
mitted with dyspnœa, the right chest was dull, the respiration
was laryngeal ; there was no lividity. The child was still
suckled ; not emaciated, but extremely blanched.

She was very precocious, and had the characteristic broad
sunken nose. After death, the right lung was found col-
lapsed, dense, firm, airless and bloodless.

Nearly the whole surface of the interior of the larynx is
covered with cauliflower vegetations which are largest poste-
riorly, and extend upwards on the aryteno-epiglottidean fold.

No vocal cords are apparent.   The air-passage is very considerably diminished in capacity.

Atrophied kidney with calculus in ureter.

From a lad of 18, who died suddenly from an injury.

The left kidney is nothing more than an oval sac, two inches long by an inch wide. There is no gland tissue. The interior of the sac resembles the dilated pelvis of a kidney.   In the ureter, close to its commencement, is a uric acid calculus, the size of a large bean, firmly impacted.   The ureter is obliterated beyond. The right kidney was larger than normal.   The other organs were healthy.

Encephaloid tumour springing from the choroid coat of the eye at the yellow spot.

The tumour is the shape of a large cherry-stone, seated on a larger base, it has a smooth uniform surface, is of a rather soft and friable nature, and consists almost entirely of small cells. It has pushed the retina before it ; a considerable quantity of yellow serum intervening between it and the coarcted retina. It was removed from a patient whose right eye was disorganized, apparently by acute glaucoma.   The humours were so muddy, that the fundus could not be examined by the ophthalmoscope. There had been intense ciliaralgia for ten days.

The disease dated three or four months back, the eye having become rapidly dim, but without neurosis.   The eye was removed, to relieve the patient of a useless and painful organ, and to guard the remaining eye from already threatening sympathetic disease.   The left eye continues sound, after three months.

Presented by Mr. Couper.

Hydrocele of the tunica vaginalis testis, with deposit of lymph, and much thickening.

The tunica vaginalis is dilated to the size of a large orange, its walls are much thickened, and the deposit, internally, of layers of firm lymph, which partially embeds the testicle, seated at the back part,   It contained a sero-purulent fluid, with large

flakes of recent lymph.   From a man aged 38, who had died suddenly from other disease.

Presented by Mr. F. M. Mackenzie.

Perforating ulcer of the stomach.

Near the small curvature of the stomach, about an inch and a-half from the pylorus, is an opening the size of a three-penny piece, its edges are smooth from eversion of the mucous membrane.   The opening in the serous membrane is smaller, with sharp edges.

The preparation is interesting from the history.   The patient when admitted into the Hospital, had no constitutional symptoms whatever; he complained of pain in the epigastrium, but not on pressure.   The second day peritonitis set in, and he died on the third, the ulcer having given way, and the contents of the stomach having passed into the peritoneal cavity.

Mammary gland removed by escharotics.

The entire right breast of a woman, which was removed by escharotics for scirrhus disease.   The treatment was conducted by a professed cancer-curer, and the paste used was probably the chloride of zinc.   The sore never healed, and the disease has now extended widely.

Presented by Dr. Kibbler.

United extra-capsular fracture of neck of femur.

The patient died of pyæmia seven months after his injuries.   At the time of his admission a fracture of the cervix femoris on the right side was detected, the limb being shortened, everted, and freely movable.   It was quite certain from the free movement, that there was no impaction.   The straight splint was used, and good union followed.   The man's death had no connection with this injury.   At the *post-mortem* the fracture was found to present all the features which are usually held to indicate impaction.   These are well shown in the appended Woodcut.   The great trochanter had been split into two fragments, and between these the cervix had penetrated, and in this position it had become firmly united.   The specimen is valuable

as showing the risk of error, if we infer impaction from the examination
tion of a specimen after repair has taken place.
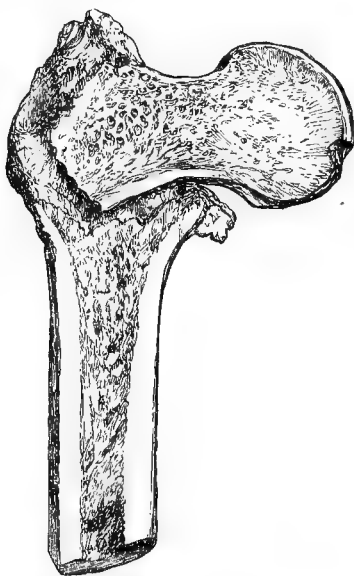
Obtained and presented by Mr. Hutchinson.　　See p. 413.

Dwarfed radius after injury to epiphysis.

The bones from the case above referred to, p. 403.　(See also the
London Hospital Reports, Vol. ii., p. 351, for details of the case.)
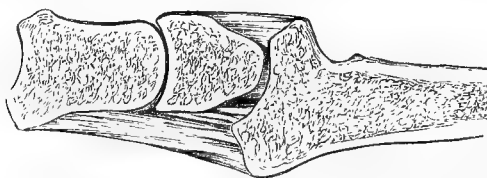
Woodcut showing a vertical section of the carpal end of
the radius and of carpal bones ;　the latter resting on
a projecting ledge, as described in the text.

The carpal extremity of the radius is much altered in form, the chief
peculiarity consisting in a projecting lip of bone on its palmar aspect,

upon which the carpus rests. There is no evidence of fracture now apparent.

United fracture of femur, with displacement.

The right femur of a child, showing a united fracture in the upper part of the middle third. Considerable difficulty had been encountered in keeping the child quiet. Plaster of Paris had been applied, but the foot becoming mottled and cool, was of necessity removed in fear of gangrene. After this a gutta-percha splint had been used. The fracture occurred on June 23rd, and the child died of cholera on July 31st. The specimen shows over-lapping to the extent of an inch, the lower fragment behind the upper one, and the upper one slanting forwards. The upper fragment is not abducted, the direction of the shaft being straight, with the exception of the bend forwards. The condition of the bone suggests that the displacement was caused wholly by the upper end of the lower fragment pressing against and displacing the lower end of the upper one.

Obtained and presented by Mr. Frederick Mackenzie.

United fracture of fibula, with some displacement.

United fracture of the fibula in its lower third, with slight displacement of the tibia forwards. The patient was a young man who died of cholera in July, 1866. Deformity about his ankle was noticed, and, on inquiry, he stated that he had been treated in the Hospital two years ago for "broken leg." The deformity most noticeable consisted in prominence of the tibia on the instep, as if it had been partially displaced forwards. The specimen consists of the lower third of the tibia and fibula, with the astragalus and os calcis. The fibula shows firm union of an oblique fracture, about three inches above the tip of the outer malleolus. The lower fragment slants backwards. At the seat of union the end of the lower fragment is external to that of the upper one. The anterior edge of the tibia projects forwards over the articular surface of the astragalus. The lower part of the tibia posteriorly appears somewhat thickened, especially on its outer part. Possibly the periosteum may have been pulled off here, or a thin lamella of bone detached. This specimen probably illustrates a frequent condition after " Pott's " fracture.

Obtained and presented by Mr. Frederick Mackenzie.

Fracture of the tibia, united, with displacement.

Cast of a left tibia, showing the results of fracture, a little above the commencement of the lower third. The fracture has an obliquity of nearly three inches. The displacement is the usual one, the lower fragment having been drawn upwards behind and to the outer side
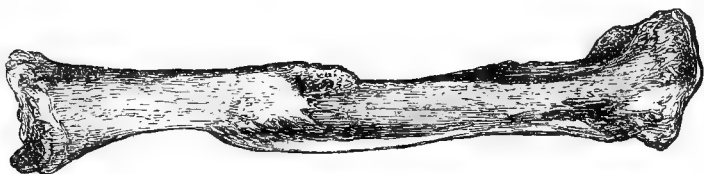
The woodcut shows the displacement as seen from the inner side.

of the upper one. The lower extremity of the upper one projects on the inner side.

From a specimen in the possession of Mr. Bathurst Dove.

Recent fracture of the femur.

(G. b. p. 51.) A fracture of the femur at the commencement of its lower third, slightly comminuted and oblique from within outwards and downwards. During life the lower fragment was displaced behind the upper one, and, from the shortening, the fracture was supposed to be much nearer to the knee-joint than it really is. On the post-mortem table the effect of bending the knee was tried, and it was found quite impossible to effect reduction with the limb in this position, as the lower fragment pressed against the upper and tilted it forwards. The more the knee was bent the greater was the difficulty in counteracting the tendency to shortening, probably owing to the quadriceps extensor.

Obtained and presented by Mr. Hutchinson.

Compound fracture of femur with incomplete union.

(G. b. p. 19.) The left femur of J. Crisp, æt., 24, showing a partially united fracture at the middle of the bone. The lower fragment has been drawn upwards on the inner side and behind the upper one. The limb would have been shortened to the extent of at least

two inches. The fracture was compound and comminuted. The ends of the bones are separated by a detached fragment, which is in process of exfoliation, and are at a distance of three-quarters of an inch from each other at the nearest place. Union is effected by long bridges of bone arching between the two. The quantity of new bone produced is very considerable, but it occurs only near to the site of the injury. In this case, but little treatment could be adopted, owing to the severity of the injuries which the man had received. He had a fracture of the neck of the opposite femur. Death from pyæmia six months after the injury. Length of obliquity two inches.

Obtained and presented by Mr. Hutchinson. (See p. 409.)

Exfoliation of part of ischium.

A portion of the tuberosity and ramus of the right ischium ex-foliated, after a severe burn of the nates. (See case, Gold Medal Reports, p. 207).

Presented by Mr. F. S. Colquhoun.

Comminuted fracture of the tibia, united, with great displacement.

A cast of part of a right* tibia, showing a united fracture in the lower third. The displacement is great, the lower fragment riding

Woodcut showing displacement of the lower fragment in front of the upper one; seen from the outer side.

in the front of the upper one. There is overlapping to the ex-tent of about an inch. There is a short detached fragment behind the end of the lower one, and the three are welded together by strong bridges of porous bone.

From a preparation in the possession of Mr. Bathurst Dove.

* Owing to the neglect of the wood engraver, to allow for reversal in printing, this woodcut appears to represent a *left* instead of a *right* tibia.

REPORT ON THE

MEDICAL CASES UNDER TREATMENT IN THE LONDON HOSPITAL,

DURING THE YEAR 1865.

BY JAMES EDWARD ADAMS.

MEDICAL REGISTRAR.

THE total number of cases under treatment in the medical wards during the year 1865 was 1288, arranged as follows : —

	MALES.	FEMALES.	TOTAL.
Remaining in the House, Jan. 1st.	56	56	112
Admitted since	658	518	1176
Remaining on Dec. 1st.	65	45	110

The average stay of each patient in the Hospital was, for men, 32·8 days ; for women, 33·29.

Of the whole, 164 died, making a gross mortality of 12·732 per cent.

TABLE I.

LONDON HOSPITAL STATISTICAL RETURN OF IN-PATIENTS' DISEASES.

Cases Tabulated.	Remaining in Hospital, Jan. 1st, 1865.	Admitted Since.	Total for the Year.	Discharged Cured.	Relieved or Out-Patient.	Unrelieved, or Irreg. Disch'd.	Died.	Remaining in Hospital on Dec. 31st.
(ZYMOTIC DISEASES.)								
Class I.—Order I.								
Varicella	0	2	2	2	0	0	0	0
Croup	0	2	2	1	1	0	0	0
Scarlatina	0	6	6	2	2	0	0	2
Quinsy	1	9	10	7	3	0	0	0
Erysipelas	1	13	14	5	8	1	0	0
Pyæmia	0	1	1	0	0	0	1	0
Carbuncle								
Dysentery	2	6	8	3	3	0	0	2
Diarrhœa	0	13	13	8	5	0	0	2
Typhoid Fever (typhia)	3	19	22	5	7	0	6	4
Typhus	0	3	0	0	1	0	2	0
Febricula	0	3	3	3	0	0	0	0
Ague	1	4	5	2	3	0	0	0
Rheumatism { Acute	22	121	143	64	55	2	4	17
{ Sub-Acute	1	88	89	17	58	3	2	9
Others								
Order II.								
Gonorrhœa	0	0	0	0	0	0	0	1
Primary Syphilis	0	0	0	0	0	0	0	0
Secondary syphilis	8	28	36	20	12	4	0	1
Tertiary syphilis	0	8	8	0	7	0	1	0
Others								
Order III.								
Purpura	0	6	6	3	2	0	1	0
Delirium Tremens	1	7	8	1	6	0	1	0
Alcoholismus	0	23	23	20	2	0	1	0
Order IV.								
Scabies	0	3	0	0	0	3	0	0
Psoriasis	1	0	0	0	0	0	0	0
(CONSTITUTIONAL DISEASES.)								
Class II.—Order I.								
Gout	1	13	14	0	13	1	0	0
Anasarca (from Morb. Cord.)	0	16	16	0	9	2	5	0
Cancer	0	14	14	0	4	4	5	1
Mortification	0	1	1	0	0	0	1	0
Polysarcia	1	3	4	0	4	0	0	0
Order II.								
Bronchocele	0	3	3	0	2	1	0	0
Phthisis	3	38	41	0	27	0	12	2
Hæmoptysis	0	8	8	0	7	0	1	0
Debilitas	0	12	12	5	7	0	0	0
Melancholia	0	4	4		3	0	0	1

Cases Tabulated.	Remaining in Hospital Jan. 1st, 1865.	Admitted Since.	Total for the Year.	Discharged Cured.	Relieved or Out-Patient.	Unrelieved, or Irreg. Disch'd.	Died.	Remaining in Hospital on Dec., 31st.
(LOCAL DISEASES.)								
Class III.—Order I.								
Meningitis	1	1	2	0	0	0	2	0
Paralysis	1	13	14	1	10	0	3	0
Chorea	1	37	38	12	24	0	1	1
Mania	0	2	2	1	0	0	1	0
Epilepsy	1	10	11	3	6	0	0	2
Hysteria	1	6	7	0	4	2	0	1
Neuralgia	1	1	1	0	1	0	0	0
Hemiplegia	4	46	50	0	35	4	8	3
Paraplegia	2	11	13	0	9	0	2	4
Keraltitis	0	2	2	0	2	0	0	0
Neuritis	0	1	1	0	1	0	0	0
Sciatica	2	10	12	3	8	0	0	1
Vertigo	1	5	6	3	3	0	0	0
Lumbago	0	5	5	1	4	0	0	1
Locomotive Ataxis	0	5	5	0	1	0	0	4
Order II.								
Pericarditis(admitted as such)	0	1	1	0	0	1	1	0
Morbus cordis	4	42	46	4	19	3	14	6
Aneurism of aorta, &c.	2	5	7	0	5	0	2	0
Agina Pectoris	0	1	1	0	1	0	0	0
Fainting	0	6	6	2	4	0	0	1
Phlebitis	0	1	1	1	0	0	0	0
Order III.								
Broncho-pneumonia	4	22	26	2	12	0	9	3
Laryngitis(Œdema of glottis)	1	11	12	3	6	0	2	1
Bronchitis	0	30	30	6	11	0	5	8
Pleurisy	1	14	15	7	5	2	0	1
Pneumonia	6	23	29	7	11	0	10	1
Hæmoptysis	1	8	9	0	8	0	1	0
Pleuro-pneumonia	0	16	16	4	9	2	1	0
Dyspnœa (from Tumours of Larynx).	0	2	2	0	0	0	2	0
Order IV.								
Gastritis	0	1	1	1	0	0	0	0
Enteritis	0	3	3	2	1	0	0	0
Peritonitis	1	8	9	0	0	0	3	0
Metritis	1	1	2	0	2	0	0	1
Constipation	0	6	6	4	2	0	0	0
Menorrhagia	0	2	2	0	2	0	0	0
Colic	0	4	4	1	2	1	0	0
Typhlitis	0	1	1	1	0	0	0	0
Gastric Ulcer	1	6	7	0	7	0	0	1
Plumbismus	1	9	10	3	6	1	0	0
Mercurialismus	0	5	5	0	4	0	1	0
Dyspepsia	1	11	12	0	12	0	0	0
Urticaria	0	3	3	3	0	0	0	0
Abdominal Tumour (uncertain).	1	0	1	0	1	0	0	0
Hæmatemesis	0	4	4	2	1	0	1	0

Cases Tabulated.	Remaining in Hospital Jan. 1st, 1865.	Admitted Since.	Total for the Year.	Discharged Cured.	Relieved, or Out Patient.	Unrelieved, or Irreg. Disch'd.	Died.	Remaining in Hospital on Dec. 31st.
Cl. III.—Order IV. *continued.*								
Apoplexy	0	8	8	0	0	0	8	0
Melæna								
Hæmorrhoids								
Morbus Addisonii	0	1	1	0	0	0	1	0
Spleen Disease	0	1	1	1	0	0	0	0
Hepatitis								
Jaundice	0	8	8	3	5	0	0	1
Anasarca, post Scarlatina	0	5	5	1	0	0	2	2
Cirrhosis (without ascites)	3	3	6	0	3	1	2	0
Ascites	3	24	27	2	11		9	5
Order V.								
Nephritis	0	1	1	0	0	0	1	0
Nephria (Bright's disease, Albuminuria).	8	56	64	0	32	5	17	10
Diabetes	1	7	8	0	6	1	1	0
Malingering	0	3	3	0	1	2	0	0
Hæmaturia	1	1	2	0	2	0	0	0
Cystitis	0	1	1	0	0	1	0	0
Suppression	0	1	1	0	0	0	1	0
Order VI.								
Ovarian Dropsy	0	9	9	0	4	1	2	2
Ovaritis	0	4	4	1	3	0	0	0
Order VII.								
Synovitis	0	1	1	1	0	0	0	0
Ostitis (including periostitis and endostitis)	0	2	2	0	2	0	0	0
Herpes zoster	0	1	1	0	1	0	0	0
Internal hæmorrhage	0	1	0	0	0	0	0	1
Hydrarthrosis	0	1	1	0	1	0	0	0
Arthritis (Rheum.)	0	1	1	0	0	0	0	1
Inanitio	0	4	4	0	3	0	1	0
Peri-uterine hæmatocele	0	2	2	0	1	0	0	1
Uterine Polypus	0	2	2	1	1	0	0	0
Displacement	0	6	6	0	5	0	1	0
Fibroid Tumour.	0	7	7	2	4	1	1	0
Dysmenorrhœa.	0	9	9	2	7	0	0	0
Uterine diseases (cases not specified)	7	27	34	0 4	25	0	1	4
(DEVELOPMENTAL DISEASES.) Class IV.—Order I.								
Bedsores (admitted as such)	0	2	2	0	0	0	2	0
Phlegmasia . . ;	0	1	1	0	0	0	1	0
Order II.								
Chlorosis	0	1	1	0	1	0	0	0
Amenorrhœa	1	7	8	3	5	0	0	0
Childbirth	1	1	2	0	0	0	0	0
Pelvic Cellulitis	1	14	15	2	11	0	1	1

Cases Tabulated.	Remaining in Hospital Jan. 1st, 1865.	Admitted Since.	Total for the Year.	Discharged Cured.	Relieved, or Out-Patient.	Unrelieved, or Irreg. Disch'd.	Died.	Remaining in Hospital on Dec. 31st.
VIOLENT DEATHS AND DISEASES. (ACCIDENT.) Class V.—Order I.								
Poisoning by Laudanum .		2	2	1	1	0	0	0
,, ,, Burnett's Fluid	0	2	2	2	0	0	0	0
,, ,, Ammonia . .	0	1	1	1	0	0	0	0
,, ,, Oxalic Acid .	1	3	4	3	1	0	0	0
,, ,, Sugar of Lead	0	1	1	1	0	0	0	0
,, ,, Potass Binoxal.	0	2	2	2	0	0	0	0
,, ,, Sulphuric Acid	0	3	3	2	0	0	1	0
,, ,, Nitric	0	1	1	1	0	0	0	0
,, ,, Chloroform . .	0	1	1	1	0	0	0	0
,, ,, Naphtha . .	0	2	2	1	0	0	0	0
,, ,, Belladonna . .	0	1	1	1	0	0	0	0
,, ,, Hyd. Ammon. Chlor . . .	0	1	1	1	0	0	0	0
,, ,, Tra. Camph.Co.	0	1	1	1	0	0	1	0
,, ,, Phosphorus .	0	1	1					
,, ,, Internal Hæmorrhage (source unknown) .	0		0	0	0	0	0	0
	0	1	1	0	0	0	1	0

The same cause which made the death rate so high last year, has influenced our mortality for the past twelve months; viz. : the inadequate accommodation in proportion to the number of applicants, and consequently, the severity of the cases admitted. No fewer than seventeen cases are noted in the register as being "moribund when admitted ;" and it has not unfrequently happened that cases of phthisis, anasarca, &c., have been taken in, lest they should did during the return home.

The Hospital has been quite free from anything like an epidemic of zymotic or other infectious diseases. Most of the cases of this class were admitted for surgical injuries, and in no case was the disease transmitted to attendants or students.

Of all the cases of typhoid fever, in one case only were the symptoms developed after more than a week from the time of admission. In this case, the patient was a girl, aged 19, admitted on August 6th, for pleurodynia, and the first manifestations of fever were not shown until September 2nd. The disease ran a very severe

course, and although she did not suffer any relapse, her convalescence was very gradual, and she was in the Hospital altogether for seventy-seven days. This patient, when first admitted, occupied, for three weeks, a bed not far from a water-closet, the drain of which was afterwards found to have been out of order at the time.

Of the six cases of typhoid which proved fatal, three were examined and found to have well-marked intestinal lesion ; and one case in particular was of much interest, as showing that the amount of diarrhœa is not necessarily an exponent of the amount of ulceration of the bowels ; for in this case there had been diarrhœa for one day only, and yet numerous ulcerations, some as large as a five-shilling piece, were found in the ileum, in some parts almost perforating its coats.   In one case the rash was of a mixed character, and, in one other, quite absent; the remaining cases were well-marked.   No specific plan of treatment was adopted, they were all placed under the most favourable hygienic conditions, with carefully regulated diet and stimulants when necessary,

There were three cases of typhus.   One of them was admitted in a dying state; and another was admitted for a self-inflicted incised wound of throat (probably an example of typho-mania) followed by a characteristic rash, and death in two days.

Excluding cases still under treatment, there were 112 cases of acute rheumatism, four of which died, three from pericarditis, and one from albuminuria and pleuritic effusion.

They were all treated with blisters or alkalies, with the following comparative results :—

	Total.	Cured.	Relieved.	Died.	Mean residence in days.
Blisters	46	35	10	2	37·10
Alkalies	55	22	34	2	35·87

Of the cases which recovered, five had pericarditis, in three of which the symptoms were manifest at the time of admission; of the remaining two, one was treated by blisters, and the other by alkalies.

Forty-three out of the 112 cases had valvular disease at the time of admission, in two only was it acquired during the treatment; in one of these, *peri*-cardial mischief was recognised at the time of admission, and in the other a friction sound became audible on the third day.

Morbus Cordis.

Of the cases of morbis cordis I have selected forty, which were admitted as such (and not for anasarca, as many were), and find that nearly sixty per cent. of the valvular diseases are traceable to rheumatism. In one case, the patient, a child of eight, had recently suffered from scarlatina, and ague was the only constitutional disease that another patient admitted. They may be tabulated as follows:—

Disease of mitral valve	22
,, aortic ,, ...	6
,, aortic and mitral valve . .	6
,, tricuspid ,, . .	3
Hypertrophy	3

Of course, in some cases of valvular diseases there was hypertrophy as well, but in the three cases, tabulated, it formed the chief feature in the case. There were besides many other cases of heart-disease, but the majority were so intimately associated with albuminuria and anasarca, that one disease could hardly be said to take precedence of the other. The two together form one of the most fatal of the maladies admitted into our wards, and, next to rheumatism, the most frequent.

Hemiplegia.

Of forty-six cases of hemiplegia, eighteen were of the right side, and twenty-eight of the left. In eight cases there was loss of speech, in all of which the paralysis was on the right side. All these were recent cases.

There were eight fatal cases (including those registered as apoplexy), in seven of which the symptoms were owing to intra-cranial hæmorrhage, as seen in the following Table:—

Symptoms.	*Post-mortem* Appearances.
Left hemiplegia.	Old clot in right corpus striatum, and optic-thalamus, and lymph on the posterior margin of the foramen magnum on the under surface of dura mater. Hypertrophy of left ventricle. All the valves atheromatous; kidneys white and friable.
Right hemiplegia.	A large recent clot in substance of left hemisphere, optic thalamus, corpus striatum. Kidneys cystic. Great hypertrophy of left ventricle. Aortic valves calcareous.
Left hemiplegia.	White softening between the anterior pillars of the fornix. Slight atheroma of aorta. Calcareous deposits in the circle of Willis. Left kidney waxy.
Left hemiplegia.	Pale yellow clot in substance of right hemisphere. Other particulars not noted.
Complete coma. No Paralysis.	Recent extravasation in third and fourth ventricles. Atheroma of aorta and circle of Willis. Kidneys waxy.
Coma.	Large quantity of blood effused into the meshes of pia mater. This patient had epileptic convulsions; had been trephined eight years previously for fracture. Other organs not examined.
Left hemiplegia.	Large clot in right hemisphere and ventricle involving the corpus striatum. Left ventricle hypertrophied. Kidneys healthy.
Left hemiplegia.	A large recent clot in right hemisphere, compressing the corpus striatum and optic thalamus. Atheroma of the middle cerebral arteries. Hypertrophy of left venticle, valves atheromatous. Kidneys granular.

The ages and sexes for the whole number were as follow :—

Ages	20	25	30	35	40	45	50	55	60	65
Males	3	0	5	2	4	4	5	4	1	4
Females.	1	2	2	1	1	1	0	1	2	_2

Total males 33, and females 13. Total 46.

Paraplegia.

There were eleven cases of paraplegia admitted during the year, of which four were still under treatment on December 31st. There were two fatal cases; one a male of 46, in whom the symptoms came on suddenly three days before admission, accompanied by lumbar pain; the *post-mortem*, showed white softening of the cord just above the cauda equina. In the other fatal case, the symptoms had been preceded for some time by lumbar pains. The paralysis was complete, and there was a large bedsore over the sacrum at the time of admission. The lumbar portion of the cord was found to be in a state of red softening, and surrounded by purulent lymph. Kidneys waxy. (Urine albuminous during life.)

Of the cases remaining, one was supposed to be hysterical, occurring in a girl, aged 20. There was no affection of bladder nor of the rectum, nor any loss of sensation; she could move her legs in bed, but could not stand. In another case, the onset was sudden, accompanied by lumbar pains, followed by almost complete recovery.

General Paresis; Paralysis of Special Nerves, etc.

There were five cases of this disease, one of which proved fatal. In this there was also albuminuria, with coarsely granular casts and uræmia. They were all spirit drinkers.

Two out of three cases of facial paralysis were fatal; one was found to be dependent on syphilitic disease of the base of the skull, (Jennings' case), and in the other there was a cicatrix and induration over the parotid gland, and, after death, lymph was found at the base of the brain, and in the fissure of Sylvins.

There were two cases of paralysis of the third nerve, both patients were syphilitic, and were materially benefited by iodide of potassium. There was one case of paralysis of the sixth in a patient who had locomotive ataxia; and one case of paralysis agitans in a man aged 33.

Chorea.

There were thirty-seven cases of chorea, the majority being in ill-nourished children. All made good recoveries, with the exception

of one child, aged 6, who was exceedingly emaciated. Most of them were treated with Fowler's solution; but some cases, in which malnutrition appeared to be the chief cause, were treated with good diet, and Vinuum Ferri; and made satisfactory progress. Of these, fifteen (40½ per cent.) had valvular disease of the heart. One case, in which the upper extremities were chiefly affected, occurred in a girl of 18, seven months advanced in pregnancy. This patient was subsequently delivered at full time of a female child.

Ages	5 and under.	10	15	20	25	30	35	TOTAL.
Males ..	0	3	4	0	0	0	1	8
Females.	2	13	11	3	0	0	0	29

The average duration of treatment was 38·6 days.

Respiratory Organs.

There were twenty-nine cases registered as uncomplicated pneumonia, ten of which were fatal (34·48 per cent.). In at least twelve cases both lungs were affected, and in those, in which the disease was limited to one side, the majority were of the right; they were nearly all in the second or third stage when admitted. The others (broncho- and pleuro-pneumonia) were, for the most part, chronic with physical signs obscure, and frequently associated with albumen in the urine.

Of fifteen cases of pleurisy, six had large effusion at the time of admission. They all made good recoveries, with the exception of one patient, who, when admitted, had his right chest full of fluid, subsequently had pneumonia of both lungs and two attacks of erysipelas. He was, notwithstanding, fairly convalescent when he discharged himself, having been in the House for ninety-four days. In nine, the disease was on the right side, three on the left, and three were not noted (being slight cases).

The mortality for the cases of morbus cordis was 30·6 per cent. There were also two fatal cases of aneurism, of which I have appended a brief account.

The cases of Bright's-disease presented no particular features of interest. Of the fatal cases, one had uræmic convulsions, the others dying from serous effusions, bronchitis, and œdema pulmonum. Mortality 26·56 per cent.

A TABLE OF THIRTEEN CASES OF CANCER.

No.	Variety.	Age.	Sex.	Organ Affected.	Occupation.	Result.
1	Colloid.	49	M.	Stomach, pancreas, and lumbar glns.	Ironfounder.	Died.
2	Scirrhus.	30	F.	Bladder and rectum.	Married.	Do.
3	Do.	50	F.	Uterus.		Out-patient.
4	Do.	28	F.	Do.	Do.	Do.
5	Medullary.	55	M.	Liver, and pancreas.	General dealer.	Died.
6	Colloid.	43	M.	Intestinal canal.	Labourer.	Out-patient.
7	Medullary and scirrhus.	20	F.	Mammæ, ovaries, kidneys.	Servant.	Died.
8	Epithelial.	67	F.	Vagina.	Widow.	Out-patient.
9	Do.	37	F.	Uterus.	Married.	Do.
10	Do. Excised.	30	F.	Os uteri.		Do.
11	Scirrhus.	40	M.	Liver.	Tavern waiter.	Died.
12	Epithelial.	38	F.	Vagina.	Married.	Out-patient.
13	Do.	35	F.	Epiglottis.	Do.	Do.

STATISTICS OF THE

MAJOR OPERATIONS PERFORMED IN THE LONDON HOSPITAL DURING THE YEAR 1865.

COMPILED BY C. F. MAUNDER, F.R.C.S.

SUMMARY OF OPERATIONS.

Amputations of Thigh.	Recovered	Died.
Primary . . 3	1	2
Secondary . 7	2	5
Disease . . 10	4	6
Total number 20	7	13

Amputations of Leg.	Recovered	Died.
Primary . . 5	1	4
Secondary . 2	0	2
Disease . . 3	1	2
Total number 10	2	8

Pirogoff's amputation of foot (primary), one case which recovered.

Amputations of Arm.	Recovered	Died.
Primary . . 5	3	2
Secondary . 0	0	0
Disease . . 0	0	0
Total number 5	3	2

Shoulder-joint, amputation at (primary), one case which recovered.
    ,,   ,,   ,,   (secondary), one case which recovered.

Operations for Strangulated Hernia.

Species.				Total No.	Sac opened.	Not.	Re-covered.	Died.
M.		F.						
Fem.	Ing.	Fem.	Ing.					
1	18	10	0	29	20	9	18	11

There were three cases of excision of the elbow (primary), which recovered.

There was one „   „   (secondary), which recovered.

 „   were two „   „   (disease), which recovered.

 „   was one „.   „   (disease), which died.

There were five cases of trephining (primary) which died.

 „   three „   „   „   which recovered.

There were seven cases of tumour of breast, which recovered.

There was one case „   which died.

The tumours removed were twenty in number; of which sixteen recovered and four died.

There were six cases of lithotomy; four of which recovered and two died.

There was one case of extraction of calculus from the female (through a vesico-vaginal fistula), which recovered.

There were two cases of removal of testis which recovered.

There were two cases of un-united fracture, one of the femur in an adult male, one of the tibia and fibula in a female child; both were "pegged," but union did not take place.

There was one case of fixity of lower jaw from contraction of cicatrix following cancrum-oris in a child aged six. Esmarch's operation was performed by Mr. Couper with fair result.

There were four cases of ligatures of arteries, of which three recovered and one died.

AMPUTATIONS OF ARM.

Age.	Sex.	Operator.	Cause.	Period after Accident or commencement of Disease.	Days in Hospital after operation.	Recovered.	Died.	Cause of Death.	Remarks.
6	M	Mr. Hutchinson	Com. com. fract. with laceration	2 h.		1			Amp. by circular method, middle of arm
18	M	Mr. Maunder	Comp. com. frac. with laceration	2 h.		1			Amp. by long post. and short ant. flaps, mid. of arm
22	M	Mr. Maunder	Com. frac. of radius and ulna and humerus; also, com. com. fract. of right fibula, with contusions	6 h.	27		1*	Erysipelas, and exhaustion	Amp. of left arm by internal and external flaps at upper third
66	M	Mr. Maunder	Com. frac. of humerus, opening elbow-joint, extensive laceration of fore-arm	8 h.	24		1	Exhaustion	Very feeble subject
30	M	Mr. Couper	Comp. com. frac. fore-arm, frac. of humerus	4 h.	3 m.	1	0		Amp. below simple fracture
						3	2		

* Also, amputation of thigh secondarily.

OPERATIONS FOR STRANGULATED HERNIA.

Age.	Sex.	Species.	Period of Strangulation.	Sac opened or not.	Days in Hos. after operation	Recovered.	Died.	Operator.	Cause of Death, and Remarks.
20	M	R. Ing.	30 h.	Yes	40	1		Mr. Curling	
70	M	R. Ing.	8 h.	Not	47	1		Mr. Hutchinson	
63	M	L. Fem.	30 h.	Not	24	1		Mr. Hutchinson	
53	F	R. Fem.	5 d.	Yes	68	1		Mr. Hutchinson	Gut protected by omentum
42	F	R. Fem.	48 h.	Not	28	1		Mr. Hutchinson	Blood in first stool
63	F	Fem.	12 h.	Not	35	1		Mr. Hutchinson	
53	F	R. Fem.	48 h.	Not	26	1		Mr. Hutchinson	
30	F	L. Fem.	48 h.	Yes	7		1	Mr. Hutchinson	Exhaustion
56	F	R. Fem.	56 h.	Yes	1		1	Mr. Hutchinson	Peritonitis
43	M	R. Ing.	10 h.	Not	23	1		Mr. Maunder	
17	M	R. Ing.	4 h.	Yes	26	1		Mr. Maunder	Great collapse; tense and exquisitely tender tumour; stricture at neck of sac, very tight. Slight peritonitis subsequent to operation
28	M	L. Ing.	26 h.	Yes	18	1		Mr. Maunder	
48	M	R. Ing.	12 h.	Yes	6 w.	1		Mr. Maunder	Removed great mass of omentum
68	F	R. Fem.	48 h.	Not	42	1		Mr. Maunder	
59	F	R. Fem.	4 d.	Yes	2 m.		1	Mr. Maunder	Sac sloughed; necrosis of pubes. Exhaustion
54	M	R. Ing.	5 d.	Yes	12 h.		1	Mr. Maunder	Collapse; bowel gangrenous at time of operation, made artificial anus
21		L. Ing.	12 h.	Yes	6		1	Mr. Maunder	Peritonitis; tight stricture; perforation at seat of stricture after twelve hours' strangulation only
56	M	R. Fem.		Yes	142		1	Mr. Couper	"Lump appeared suddenly three days ago." Constipation since, but no vomiting. Incision exposed mass of highly

HERNIA OPERATIONS. (*Continued.*)

Age.	Sex.	Species.	Period of Strangulation.	Sac opened or not.	Days in Hosp. aft. operation.	Recovered.	Died.	Operator.	Cause of Death and Remarks.
61	M	R. Ing.	16 d.	Yes	38	1		Mr. Couper	congested fibro-cellular tissue size of walnut outside sac—sac small and empty Sero-sanguineous fluid in sac, which crepitated under the hand
87	F	Fem.	108 h.	Yes	1		1	Mr. Couper	Bowel gangrenous made artificial anus
30	M	R. Ing.	20 h.	Yes	1		1	Mr. Couper	Bowel perforated at three points ; made artificial anus
61	F	R. Fem.	4 d.	Not	39	1		Mr. Little	
27	M	R. Ing.	24 h.	Yes	53	1		Mr. Little	Cut away omentum
76	M	R. Ing.	4 d.	Yes	2		1	Mr. Little	" Reduction *en masse* by patient himself
65	M	L. Ing.	3 d.	Yes	4		1	Mr. Little	Cut away omentum
36	M	R. Ing.	13 h.	Not	21	1		Mr. Rivington	
39	F	Fem.	4 d.	Yes	17	1		Mr. Rivington	Cut away omentum
21	M	R. Ing.	4 d.	Yes	2		1	Mr. Rivington	Peritonitis
46	M	R. Ing.	24 h.	Yes	14		1	Mr. Rivington	Jaundice & ascites Large quantity of fluid flowed at the wound
						17	12		

REMOVAL OF TESTIS.

Age.	Nature.	Duration of Disease.	Days in Hos. after operation.	Operator.	Recovered.
29	Strumous	18 m.	30	Mr. Curling	1
35	Strumous	6 m.	27	Mr. Hutchinson	1
					2

REMOVAL OF TUMOURS.

Age.	Sex.	Nature	Date of Commencement.	Seat.	Operator.	Dys. in Hosp. after Operation.	Recover'd	Died.
11	F	Cancer	3 m.	Hip	Mr. Curling		1	
58	M	Cystic	30 y.	Scalp	Mr. Couper	21	1	
30	M	Cancer	14 m.		Mr. Hutchinson	19		1
47	M	Epithelioma	14 m.	Great toe and ing. glands	Mr. Maunder	51	1*	
42	F	Lipoma	2 y.	Left costal reg.	Mr. Little	10	1	
30	F	Fibro-cellular	2 y.	Vulva	Mr. Curling	28	1	
30	M	Fibro-nuclea-ted	8 y.	Scalp	Mr. Hutchinson			1†
30	F	Melanosis	16 m.	Dorsum of foot	Mr. Maunder	30	1‡	
35	M	Epithelioma	3 m.	Cheek	Mr. Curling	18	1	
31	F	Cystic	Congenital	Scalp	Mr. Adams	3		1§
35	F	Fibro-cart.	18 y.	Groin	Mr. Couper	30	1	
37	F	Fibro-cellular	12 y.	Tongue	Mr. Little	20	1	
25	F	Cystic	4 w.	Vulva	Mr. Couper	27	1	
63	M	Rodent ulcer	2 y.	Lower eye-lid	Mr. Hutchinson	67	1	
15	M	Exostosis	1 y.	Femur	Mr. Hutchinson	31	1	
63	F	Recur-fibroid	2 y.	Fore-arm	Mr. Little	24	1	
12	F	Cystic	years	Root of neck	Mr. Little	47		1‖
40	F	Fibro-cellular	8 y.	Bursa patellæ	Mr. Maunder	46	1	
57	M	Epithelioma	2 m.	Lower lip	Mr. Maunder	26	1	
45	F	Scirrhus	5 m.	Axilla	Mr. Curling	27	1	
							16	4

* Both toe and corresponding glands were removed.

† This patient died of pyæmia after removal from the Hospital.

‡ Originated in a congenital mole. Since operation the corresponding inguinal glands have greatly enlarged.

§ Ulcerating before removal. Died of hæmorrhage.

‖ Large serous cyst in posterior inferior triangle of neck—removed portion of cyst-wall. Death from pyæmia.

AMPUTATION OF FOOT.

Age.	Sex.	Operator.	Cause.	Period after Accident or commencement of Disease.	Days in Hospital after operation.	Recovered.	Died.	Cause of death.	Remarks.
18 m.	F	Mr. Little.	Comp. fract. of metatarsus; lacerations.	4 h.	53	1			Pirogoff's, leaving epiphysis to represent the portion of os calcis.

AMPUTATIONS OF LEG.

Age.	Sex.	Operator.	Cause.	Period after Accident or commencement of Disease.	Days in Hospital after operation.	Recovered.	Died.	Cause of Death.	Remarks.
52	F	Mr. Adams	Diseased ankle-joint.	12 y.	39	1			Amp. at lower third by ant. post. flaps
53	M	Mr. Adams	Chronic ulcer—useless limb	14 y.	20		1	Secondary hæmorrhage	Arteries difficult to secure.
50	M	Mr. Hutchinson	Epithelioma of integument	20 y.	70		1		No enlarged glands
56	M	Mr. Hutchinson	Com. frac. of tibia and fibula. Suppuration	13 d.	5		1	Secondary hæmorrhage	Amp. mid. of leg by ant. post flaps.
15	M	Mr. Hutchinson	Comp. com. fract. of foot	3 h.	29		1	Pyæmia	Amp. at lower third by ant. post. skin flaps.
69	M	Mr. Maunder	Com. com. frac. of leg. Severe contusion	7 h.	4		1	Exhaustion	Traumatic gangrene & hæmorrhage.
22	M	Mr. Couper	Com. com. frac. of leg, opening ankle-joint	2 h.	73	1			Amp. by ant. post flaps, below mid. of leg.
37	M	Mr. Couper	Com. com. frac. of leg	2 h.	6		1	Exhaustion	
50	M	Mr. Couper	Com. com. frac. of leg	13 h.	1		1	Exhaustion	Emphysematous flaps, tertiary scars
65	M	Mr. Little	Com. frac. of leg, with lacerations	18 d.	27		1	Exhaustion	
						2	8		

TUMOURS OF THE BREAST.

Age.	Nature.	Date of commencement.	Days in Hospital after operation.	Operator.	Recovered.	Died.
54	Scirrhus	18 m.	38	Mr. Curling	1	
56	Scirrhus	5 m.	39	Mr. Curling	1	
60	Scirrhus	2 y.	80	Mr. Maunder	1	
70	Scirrhus	12 m.	58	Mr. Little	1	
40	Scirrhus	9 m.	6	Mr. Hutchinson		1
41	Adenocele	7 m.	38	Mr. Couper	1	
37	Adenocele	Years.	11	Mr. Hutchinson	1	
					6	1

EXCISION OF JOINTS.

Age.	Sex.	Operator.	Cause.	Period after Accident, or commencen'nt of Disease.	Days in Hos. aft. operation.	Recovered.	Died.	Cause of Death.
7	F	Mr. Hutchinson	Strumous disease of elbow-joint	2 y.	37	1		
10	M	Mr. Hutchinson	Com. frac. of humerus, opening elbow-joint; severe contusion			1*		
17	M	Mr. Maunder	Acute abscess, opening elbow-joint	10 w.	3 m	1		
24	M	Mr. Maunder	Com. fracture opening elbow-joint	3 w.	60	1		
45	F	Mr. Maunder	Com. dis. of elbow	2 h.	110d	1†		
60	M	Mr. Couper	Gun-shot wound of elbow	3 h.		1		
9	F	Mr. Little	Strumous disease of elbow	4 y.	25		1	Pyæmia
						6	1	

* Soft parts sloughed necessitating removal of two inches of the shaft of the humerus ; good result.

† Dislocation was produced by forcible extension of the fore-arm across the knee of another person, as one would break a stick.

TREPHINING OF THE SKULL.

Age.	Sex.	Part of Skull.	Operator.	Cause.	Primary.	Secondary.	Duration.	Days in Hospital after operation.	Recovered.	Died.
46	M	Rt. parietal bone	Mr. Hutchinson	Com. com. fracture, with depression, no symptoms	1		2 h.	30	1	
45	M	Right par. bone	Mr. Hutchinson	Compound depressed fracture with paralysis of left face and extremities	1		2 h.	6		1
39	M	Left parietal bone	Mr. Hutchinson	Com. frac. Dura mater torn, brain-matter escaped	1		3 h.	19		1
38	M	Left frontal bone	Mr. Maunder	Com. fracture, with depression	1		4 h.	1		1
45	M	Left parietal bone	Mr. Maunder	Com. com. frac.Dura mater lacerated	1		2 h.	2		1
13	M	Left frontal bone	Mr. Maunder	Com. fracture. Dura mater lacerated, brain - matter escaped	1		2 h.	48		1 Hernia cerebri.
11	M	Left frontal bone	Mr. Little	Com. com. fracture, with depression	1		3 h.	57	1	
7	M	Left frontal	Mr. Maunder	Com. com. fracture, with depression	1		4 h.	27	1*	
									3	5

* Died twelvemonth subsequent to operation ; large abcess in left hemisphere.

AMPUTATIONS OF THIGH.

Age.	Sex.	Operator.	Cause.	Period after accident, or commencement of disease.	Days in Hospital after operation.	Recovered.	Died.	Cause of Death.	Remarks.
15	F	Mr. Adams	Diseased knee	9 w.	27		1	Pyæmia	Acute periostitis of tibia, opening joint
52	M	Mr. Adams	Diseased knee-joint	4 w.	2m		1	Pyæmia	Abscess of thigh, opening joint
55	M	Mr. Curling	Distorted limb aft. rheumatism (?)	2 y.	50	1			Amp. by ant. post. flaps
33	M	Mr. Curling	Malignant tumour of calf	3 y.	16		1	Exhaustion	Hæmorrhage prior to operation
6	F	Mr. Curling	Strumous disease of knee	2 y.	1m	1			Amp. by ant. post. flaps
22	M	Mr. Hutchinson	Com. frac. of tibia and fibula	36 d.	35	1			
41	M	Mr. Hutchinson	Com. com. frac. of tibia and fibula.	4 d.	16		1	Pyæmia	Traumatic gangrene
24	M	Mr. Hutchinson	Strumous disease of knee	18 m.	12		1	Pyæmia	Amp. by ant. post. flaps
31	M	Mr. Hutchinson	Suppuration of aneurismal sac.	14 m.	109	1			Popliteal aneurism cured spontaneously. The sac afterwards sloughed and opened knee-joint
5	M	Mr. Hutchinson	Strumous disease of knee-joint	2 y.	29	1			Amp. by ant. post. flaps
5	M	Mr. Hutchinson	Comp. com. fract. of femur, opening knee-joint.	3 h.	26		1	Pyæmia	Amp. at upper third of thigh
11	M	Mr. Hutchinson	Acute periostitis opening knee-joint	7 w.	60	1			Joint involved secondarily
35	M	Mr. Hutchinson	Com. frac. of tibia and fibula	2 h.	19		1		Amp. by ant. post. flaps
9	M	Mr. Maunder	Strumous disease of knee-joint	3 y.	33	1			Amp. by long ant. and short post flaps
22	M	Mr. Maunder	Com. com. frac. of fibula. Profuse suppuration	22 d.	5		1	Exhaustion	Amp. through the arm was performed twenty-two days previously.
29	M	Mr. Couper	Disorganized knee	12 y.	6		1		Pus oozed from proximal end of femur which was much thickened and indurated
40	M	Mr. Little	Dislocation of knee	38 d.	2		1	Pyæmia	Gangrene of toes, and phlegmonous erysipelas followed accident
39	M	Mr. Little	Com. frac. of tibia and fibula—diffuse suppuration	7 w.	6		1	Pyæmia	Amp. by ant. post. flaps
57	M	Mr. Little	Com. frac. of tibia and fibula—phlegmonous erysipelas	14 d.	26		1		Amp. by ant. post. flaps
5	M	Mr. Little	Severe laceration of leg	3 h.	66	1			
						7	13		

AMPUTATIONS AT SHOULDER-JOINT.

Age.	Sex.	Operator.	Cause.	Period after Accident or commencement of Disease.	Days in Hospital after operation.	Recovered.	Died.	Cause of Death.	Remarks.
19	F	Mr. Maunder	Burn	5 w.	88	1			
47	M	Mr. Little	Severe laceration of upper extremity	16 h.	78	1			
						2			

LIGATURE OF ARTERIES.

Age.	Sex.	Seat of Ligature.	Duration.	Days in Hospital.	Operator.	Recovered.	Died.	Remarks.
53	F	External iliac	6 yrs.	53	Mr. Adams.	1*		Aneurism at the lower end of external iliac artery, supposed to be the result of a kick.
39	M	Brachial art. at bend of elbow.	6 wks.	40	Mr. Curling	1		Diffused aneurism following puncture; and attended by sloughing of integuments and hæmorrhage.
20	M	Femoral art. at the apex of Scarpa's triangle.	5 mos.	5	Mr. Hutchinson		1†	Popliteal aneurism
38	M	Brachial artery above bend of elbow	9 days	40	Mr. Maunder	1		Wound of hand with chisel, sloughing and recurring hæmorrhage previous to operation.
						3	1	

* Reported to have died soon after leaving the Hospital.
† Cardiac disease.

LITHOTOMY.

Age.	Sex.	Description of Calculus.	Date of commencement of symptoms	Number of calculi	Dys in Hospital after operation.	Method of operating.	Operator.	Recovered.	Died.
24	M.	Lith. ac.	3 y.	1	75	lateral	Mr. Adams	1*	
25	M.	Lith. ac.	18 m.	1	32	lateral with rectangular staff	Mr. Hutchinson	1	
11	M.	Lith. amon.	10 y.	1	19	lateral with rectangular staff	Do.		1
66	M.	Phosphat.	4 y.	1	4	median	Do.		1†
3½	M.	Lith. amon.	2 y.	1	35	lateral with rectangular staff	Do.	1	
29	M.	Carb. lime	9 y.	1	34	median	Mr. Maunder		1‡
								3	3

Calculus in Female.

| 45 | F. | Phosphate | years | 1 | 83 | | Mr. Couper | 1§ | |

* The stone weighed seven ounces.

† Patient in a very exhausted condition—with abscess and sloughing of perinæum and scrotum; abscess laid open in the mesian line, and the calculus extracted through the wound.

‡ Prior to operation the stone seemed lodged in the prostate but was found to be loose in the bladder—patient in capital health till the thirteenth day when a rigor occurred. Death from pyæmia.

§ Patient the subject of prolapsus uteri, vesico-vaginal fistula and calculus. Stone was extracted through the fistula by forceps, aided by the finger, introduced per urethram. Subsequently two operations cured the fistula.

APPENDIX.

NOTES ON THE CHOLERA EPIDEMIC OF 1866.

WHEN the outbreak of cholera—which appears to be just ending—commenced, this volume was almost wholly printed. The London Hospital having received so large a share of the cases, its medical staff felt that the profession would very naturally look for some report at their hands. As a matter of personal convenience and credit, they would very much have preferred to defer any published statement until their next volume. To have done so, however, would have been to deprive the subject of much of its freshness and interest, and to keep back, for a year, whatever of value their experience may have afforded, whilst circumstances render it very possible that it may be wanted at any time.

Under these circumstances, a meeting of those who had been chiefly concerned in the cholera epidemic was summoned, and met on August 27th. It was then decided that although more time would be absolutely essential to the production of any elaborate report, yet that it would be best to publish in the present volume, such data as could be got together. Different gentlemen were requested to report, each on such facts as had chiefly impressed him, and at the same time to state their own opinions without regard to any uniformity of plan. The editors make this explanation as to the following Appendix, in order to excuse any errors, repetitions or other traces of haste which it may display. They have felt that they might safely appeal to the indulgence of their readers on this score. The several communications of which it consists, are to rank rather as the printed data for a future collated report than as the report itself. Our next year's volume will, in all probability, contain papers on the same subject prepared with more leisure.

For the statements made in the several reports, the writers of them are, of course, alone responsible.

The reader's attention is especially requested to the fact, that Dr. Little's

p iper, on " The Use of Injections into the Veins in Cholera," p. 132, has nothing to do with the recent epidemic. The whole of that paper was printed off before the epidemic commenced to which the following notes refer.

CONTENTS.

A GENERAL REPORT ON THE CASES ADMITTED INTO THE LONDON HOSPITAL (TO AUGUST 30TH).

BY JAMES JACKSON, M.B. LOND., RESIDENT MEDICAL OFFICER.

THE first case of Asiatic cholera was admitted into the Hospital on the 10th of July. The patient was a German woman, the servant of a cattle-dealer, and had only come over from Holland on 6th of July. The details of the case have been fully given in the *Medical Times* of July 14th, so that it is only necessary to refer to it here cursorily. The woman was admitted in a state of extreme collapse at three P.M., and died at five A.M., on the following day. No further cases were admitted till the 13th, when one case came in ; on the 15th one, on the 17th two, 18th three, 19th four, 20th eight, after which the daily admissions continued rapidly to increase.

As soon as it was evident that an outbreak of cholera had commenced, a meeting was held at the residence of one of the medical staff, to consider what measures should be taken in the event of a larger influx of cases. It was then determined that George ward, containing thirty-eight beds, should be opened for the reception of cholera cases. As, after the lapse of a week, the accommodation thus afforded was found too limited, Harrison and Talbot wards, containing each fifty beds, were added ; making, in all, one hundred and thirty-eight beds for the exclusive reception of cholera cases.

The largest number in the Hospital at one time suffering from diarrhœa and cholera together, amounted to one hundred and fourteen. It thus appears that even at the height of the epidemic, the number of beds in readiness was greatly in excess of the applications for admission.

Active measures were taken to prevent contagion in the Hospital. The closets attached to the cholera wards were locked up, and all the excreta directly received into vessels containing carbolic acid, removed from the Hospital, again mixed with a solution of the acid (half-an-ounce of the strong acid to a quart of water), and buried five feet beneath the surface of the ground. The same disinfecting agent, in the form of powder, was sprinkled freely in all the wards, the odour from which was very strong, and complained of by the nurses as producing a tendency to headache and sore-throat. Similar preventive measures were employed in the laundry. All the soiled linen coming from the cholera wards was immediately placed in tubs containing a solution of chloride of lime, left to soak for some hours, and washed, finally, with carbolic-acid soap. This process was not attended with any damage to the linen.

TABLE OF ADMISSIONS, DEATHS, RECOVERIES, IN EACH WEEK FROM JULY 10TH TO AUGUST 30TH, WITH THE AGES AT DECENNIAL PERIODS.

Date.	July 10 to 19			July 20 to 26			July 27 to Aug. 2			August 3 to 9			August 10 to 16			August 17 to 23			August 24 to 30			Totals for the several ages.		
Ages.	Admitted.	Died.	Recovered.	Admitted.	Died.	Recovered.	Admitted.	Died.	Recovered.	Admitted.	Died.	Recovered.	Admitted.	Died.	Recovered.	Admitted.	Died.	Recovered.	Admitted.	Died.	Recovered.	Admitted.	Died.	Recovered.
1—10	4	3	1	23	12	11	45	23	22	16	8	8	18	6	12	9	2	7	7	2	5	122	56	66
11—20	3	2	1	13	7	6	30	16	14	19	9	10	8	3	5	8	2	6	3	1	2	84	40	44
21—30	5	5	0	20	10	10	33	20	13	17	9	8	19	9	10	4	1	3	8	2	6	106	56	50
31—40	5	4	1	16	10	6	27	16	11	19	11	8	14	6	8	8	4	4	4	1	3	93	52	41
41—50	2	2	0	13	9	4	16	12	4	11	8	3	7	4	3	2	1	1	5	3	2	56	39	17
51—60	1	1	0	8	6	2	6	5	1	6	4	2	2	1	1	3	2	1	2	1	1	28	20	8
Upwards	0	0	0	3	3	0	5	5	0	5	4	1	2	2	0	2	2	0	3	2	1	20	18	2
Totals for the several weeks.	20	17	3	96	57	39	162	97	65	93	53	40	70	31	39	36	14	22	32	12	20	509	281	228

No cases of diarrhœa, however severe, are included in the above Table. It will be seen that, of the total number, 509 (of which 47 per cent. were females), 54·9 per cent. died.

The mortality decreased week by week, that of the first week being 85 per cent., of the last 37 per cent., as will be observed by reference to the Table.

It is also noticeable that the largest number of cases, in any decennial period, occurred in that between the ages of one and ten inclusive, as 22 per cent. of the whole number admitted were under ten years of age.

The mortality increased pretty regularly with the age. The high mortality was, no doubt, influenced by the poverty and previous habits of those attacked.

Of those under ten years of age 44 per cent. died ; of those over sixty years of age, 90 per cent. died. The age of the youngest was six months ! that of the oldest ninety-nine.

The gradual decrease in the mortality is accounted for by the difference in the severity of cases. Thus, at the beginning of the epidemic, most of the patients were brought into the Hospital in a state of extreme collapse, and either died shortly after, or at the commencement of reaction. The consecutive fever, which, in many respects, resembled typhus, proved fatal in a large number of cases ; and, even in those who recovered from it, the convalescence was very protracted.

The cases which occurred during this epidemic differed from those of former ones in the severity of the cramps, which constituted a marked feature in the large majority of cases. The muscles of the calves were those chiefly affected, and the suffering thus produced was extreme, and distressing to witness. A walk through the cholera wards at night, in the earlier part of the epidemic, was really heart-rending, from the shrieks and groans of the patients, who were incessantly begging the nurses to rub, and rub hard, thus contrasting very much with what was observed here in the epidemic of 1849, in which the patients lay motionless, and apparently careless of the fate, which awaited them. This difference is probably owing to the free use of opium hitherto, and its almost complete exclusion from the list of medicines during the recent visitation. Cases occurred in which any one of the usual symptoms of cholera was absent, Thus, in some cases, collapse was the chief feature, purging, or vomiting, or both being absent. In others the sickness was most severe and incessant, often proving fatal, especially during the consecutive fever.

Great care has been taken in the diagnosis, to discriminate between cases of diarrhœa and cholera. Some few fatal cases of diarrhœa at this Hospital have been recorded by the medical papers in their weekly reports. These reports were based on the supposition that the patients had died of the disease for which they were admitted, whereas, in fact, a more careful examination in the wards, and the further progress of the case had revealed its true nature. No fatal case of diarrhœa occurred in the Hospital. Much importance attaches to the question, whether diarrhœa is, or is not, a premonitory symptom of cholera ? There is no doubt that diarrhœa existed in the majority of cases previous to the advent of cholera, but I think it desirable to state the fact, that, judging from the histories, where they were truthfully obtained from the patients or their friends, on admission, this symptom was, in a very large number of cases, absent. It was no uncommon thing for a man to go to

bed perfectly well, wake up at three o'clock in the morning, with purging and vomiting, and be brought to the Hospital in a state of extreme collapse at ten, seven hours after seizure.

Up to the 'end of August, nearly ten thousand cases of diarrhœa had been treated as out-patients. The treatment varied according to circumstances. Where the diarrhœa had existed for any length of time, with watery discharges, astringents were used, and, judging from the comparatively small number who were subsequently admitted as in-patients, with good results. Where there was much abdominal pain with slight diarrhœa, or offensive evacuations, castor-oil, with a few minims of the tincture of opium was given, to be followed by astringents, if necessary.

Some facts may be stated bearing on the question of contagion. At the height of the epidemic, upwards of one hundred persons were employed in the cholera wards ; seven medical officers, five volunteer nurses, five sisters, eighty nurses, and five porters. None of the medical officers, volunteer nurses, or sisters, were attacked, and the porters enjoyed a like immunity. Of the nurses five contracted the disease, and of these four died. Three of those who died slept outside the Hospital. In the laundry eleven women were employed in washing the linen, etc., from the cholera wards, and of this number one was attacked and died. She was also a non-resident. As the mortality among laundresses is usually very large in a cholera epidemic, it would seem that the preventive measures adopted were not altogether ineffectual. Further details, bearing on this point, will be found in another part of this report. No case of cholera occurred in the general wards of the Hospital, although during the whole period of the epidemic, they contained their full number of cases, most of whom came from cholera localities. One child, who was suffering from acute periostitis, and had been transferred to the west attic (where the first case of cholera was received) in consequence of the supervention of measles, contracted the disease, and died during the first week of the epidemic.

I cannot conclude this brief report without thanking those ladies who volunteered their services in the wards, and who were invaluable, both in their general superintendence of the nursing, and their personal attendance on the sick. The same office was admirably filled by the Sisters of All Saints', Margaret Street, during the nights. The regular Hospital nurses, many of whom volunteered for service in the cholera wards, at the outbreak of the epidemic, did their duties thoroughly well.

GENERAL REMARKS ON THE CHOLERA EPIDEMIC.

BY DR. FRASER.

It has fallen within my duty to have been engaged in four previous epidemics of cholera. I am, therefore, qualified to offer an opinion as re-

gards its cause and symptoms. It appears to me that, to constitute a true case of cholera-collapse, the nose, tongue, and breath must be cold, the urinary secretion arrested, and the voice reduced to a whisper ; when these conditions are present, the patient rarely recovers. When they are absent the following may be more or less present, and yet recovery may take place : inaudible heart's action, absence of pulse, shrivelled skin, the washerwoman's hand, skin bedewed with a cold, and death-like moisture, vomiting, purging, cramps, etc.

I consider that this epidemic began suddenly, raged fiercely, culminated sharply, and declined rapidly, as cholera has hitherto generally done, fitly represented by an ascending angle of 45°, and descending by one of 95°. No new symptoms were observed, but a greater variety, in different cases, were noticed ; for instance, some had purging and no vomiting, some vomiting and no purging, to each cramps were sometimes added, and in some cramps were the chief symptom.*

In this, as in previous epidemics, it is a melancholy fact to report that, whatever be the reason, the ill-clad, and ill-fed poor, those especially residing in unwholesome dwellings, were the chief and early victims ; just as if they, although unwittingly, unwillingly, and so far as they are concerned, unavoidably, having outraged the organic laws, are the first to fall before the slayer. If the statistics of this epidemic were worked out, it would be found, as it was in Paris in 1854, in the healthy quarters of the Tuileries, the sick were only as 1 in 110, and the deaths 1 in 193 ; whereas in the Vendome quarter, unhealthy, and inhabited by the poor, the sick were as 1 in 29, and the deaths as 1 in 115.

The first case was reported to me on the 4th of July by Dr. Jackson, the resident medical officer, who told me that a woman had been brought to the Hospital the previous night, and had died with symptoms which he believed indicated cholera. I was unable to attend the *post-mortem* examination, but remarked, apart from all other pathological appearances, if you find the bladder contracted to the size of a walnut, and empty, you may be assured that you are dealing with a case of cholera ; and you may forthwith bestir yourself and prepare for an epidemic invasion of the disease. That my warning was given not a day too soon, will be shown by the dates given by Dr. Jackson. Immediate preparations were made, a ward was prepared, nurses were told off for special duties, and, in fact, the "decks were cleared for action." There was considerable alarm at first among the nurses, and the illness of Eliza Joyce, assistant-nurse, in Wellington ward, tended to increase the feeling of dismay, as at the first blush the attack of this woman bore considerable resemblance to the effects of contagion, and from this case and one or two others, an attempt may be made to prove the contagion

* The very important point as to the presence or absence of premonitory diarrhœa is again, in my opinion, left undetermined. Many of the patients denied having had it, but we all know how careful we must be in believing such evidence, and my own belief is that it had been oftener present than absent.

of the disease; but I am satisfied that when duly examined, the attacks of these persons may be shown to have had no origin from contagion.

In pursuing this inquiry as to the persons attacked, the date and place of attack, and the localities visited by them lately, must be carefully settled. No general statements should be admitted, and no evidence employed, which has not been clearly verified. I am satisfied that many of the contradictory opinions in matters medical arises from a kind of evidence being admitted, which would not be listened to for a moment in a court of law.

Nevertheless, as a matter of precaution, every means were adopted as if contagion was a reality.

The following disinfectants were employed:—The first two or three days—Condy's fluid diluted, and chloride of lime.

Then Calvert's disinfecting powder, introduced by Mr. Little, was extensively employed for five weeks.

Afterwards, carbolic acid, largely diluted (1 to 40) mixed with sawdust, in quantities sufficient to wet the sawdust, and sprinkled about the passages, wards, and closets, etc., etc.; in fact, supplied the place of Calvert's powder heretofore employed.

None of the excreta from patients was allowed to be emptied into the sewers—instead, a portion of dilute carbolic acid fluid, about half-a-pint, was put into each chamber-pail and buried in the garden (the pails have watertight lids).

Bird's disinfecting powder, and also Lewis and Ash's powder, sent as presents, were used.

Burnett's fluid was sprinkled in the cabs that brought the patients.

The straw from the beds was burnt in each case of death, or when much soiled by excreta. The linen from the cholera wards was washed separately in the laundry of the Hospital with McDougall's disinfecting soap.

Hot coffee, beef-tea, &c., were recommended to be taken by the nurses at early dawn, and every one was advised to avoid going on duty with an empty stomach, or in a depressed condition; an extra allowance of wine and pay was made to the nurses. In a very few days the wards were in full working order, and for many days this Hospital was the only place where cholera patients could be taken. The real merits of the various modes of treatment adopted, can only be correctly weighed after a careful estimate of the results of all the cases, and this will require a close examination of the report of each case.

I may just say, that whilst I am a disbeliever in any one specific remedy, my impressions are in favour of calomel, administered in doses, varying according to the urgency of the symptoms, from five to ten and twenty grains every quarter, half, one hour, two, four, etc., etc.

In no case was severe salivation produced; and whenever the gums became tender, or a bilious stool passed, the patient recovered. It may be however, with calomel, as it is with bleeding; where blood can be made to

flow, in my experience, the case is not severe; so with calomel, if the
patient live long enough to admit the gums becoming touched, the case is
not severe. But who shall say that those very cases would not have become
severe and fatal, if the treatment had not been put into effect.

& External heat, frictions, and turpentine stupes, were much employed, and
often with good effect. I have reiterated in the wards, that with the aid of
six powerful rubbers and calomel, many have been saved. Having in re-
membrance the wonderful effects of venous injections, of which I had
had previous experience, I readily recommended this to be tried, and Mr.
Little undertook the duty. As he will furnish a special report on that
subject, I shall only say, that my confidence in the means has been raised
by my late experience. Courage, skill, and time are however all required ;
and it can be only with a large and efficient staff that such a means could
be properly and successfully conducted on a large number. I am strongly
impressed with the feeling, that by injection through the veins lies the true
means of saving life during the paroxysm of real algide cholera; for, in
this stage, all medicines passed into the stomach lie inert, as if in an
inorganic bag, being unabsorbed, but the material passed into the veins, be
it a saline fluid, the serum of animal blood, or human blood, or simple
warm water, restores life and consciousness. It may be only for a time,
but a renewal of the stimulus produces again a restoration, and it
becomes a question whether the poison will destroy life before the stimulus
saves it. A natural feeling of doubt will arise in certain minds,
whether death may not, in some cases, have been hastened by venous injec-
tions; but even this contingency is strongly overbalanced by the obvious
and marvellous reviving effects produced by the means; showing, that if it
does not always save, it at least prolongs life. And this is not the least
important part of our mission.

It will not do on this occasion to launch on the "mare magnum" of the
question of contagion or non-contagion. The more so, as it is quite as easy
to declaim against one doctrine as to support another, seeing that logical
proof of our facts is, if not impossible, at least difficult on both sides. I
have, however, an array of facts, pro and con, and, so far as number is to be
considered, a mode of proof, the non-contagionists will be victorious. In
conclusion, it will not be amiss here to allude to the first of the three
questions put forth by the Council of the Epidemiological Society. In-
formation was asked, whether cholera patients could be admitted into the
ordinary wards, or special wards set apart for the disease, of General
Hospitals, "without undue risk of the extension of the malady to the other
inmates of the Institution, and their ordinary attendants?" My reply
was, that cholera patients, so far as contagion was concerned, might be ad-
mitted with perfect safety into the ordinary wards, and, of course, into
special wards of a general Hospital. It is gratifying to find that I was
perfectly justified in giving such reply.

ABSTRACT OF NOTES * OF THE CHOLERA CASES UNDER THE CARE OF DR. A. CLARK, WITH REMARKS.

BY MR. J. M'CARTHY AND MR. DOVE.

With a view to contrasting more fairly the mortality and recoveries at different periods of the epidemic, in the subjoined Table, are stated the number of admissions on each of Dr. Clark's days : † the number of the deaths and of the recoveries : whether the death took place in collapse or in reaction ; and the treatment adopted in each case until reaction was established.

TABLE I.

SHOWING THE ADMISSIONS, MORTALITY, ETC., THROUGH THE EPIDEMIC.

Abbreviations used :—A.M.—Astringent Mixture ; L.P.—Lead Pill ; C.O.—Castor Oil ; S.L.—Saline Lemonade ; M.A.T.—Mist. Antimonii Tartarizati ; R.—Patient brought in in Reaction ; O.—No treatment ; M.Q. & F.—Mist. Quinæ, c. Ferro ; C.M.—A saturated Solution of Camphor.

Date.	Admissions.	Deaths.	Collapse.	Reaction.	Medicinal Treatment.	Living.	Treatment.	Still in House.
July 15	1	1	0	1	A.M.	0		
,, 18	1	1	1	0	,,	0		
,, 19	4	3	0	3	,,	1	L.P.	
,, 21, 22, 23	19	15	7	8	,,	4	A.M.	
,, 25, 26	24	13	9	4	11 A.M, 1 R., 1 O	10	9 A.M., 1 R.	
,, 28, 29, 30	40	20	14	6	17 O., 1 L.P., 1 C.M., 1 A.M,	20	17 O., 1 A.M., 2 R.	1
Aug. 1, 2	17	9	5	4	8 O., 1 A.M.	8	6 O., 2 A.M.	
,, 4, 5, 6	24	17	10	7	4 O., 12 C.O., 1 R.O.	7	3 O., 4 C.O.	
,, 8, 9	13	3	1	2	Sal. Lem.	8	Sal. Lem.	2
,, 11, 12, 13	20	8	5	3	1 L.P., 3 O., 4 Sal. Lem.	8	4 L.P., 3 C.O., 1 S.L.	4
,, 15, 16	6	1	1	0	Sal. Lem.	4	3 O., 1 S.L.	1
,, 18, 19, 20	9	2	1	1	1 O., 1 M.A.T.	3	1 R., 1 O., 1 S.L.	4
,, 22, 23	3	1	0	1	1 C.O.	2	1 A.M., 1 M.Qu. & F.	
,, 25, 26, 27	9	3	3	0	1 C.O., 1 M.A.T., 1 M. Q. & F.	1	1 M.Qu. & F.	5
,, 29, 30	2	0	0	0		0		2
Total .	192	97	57	40		76		19 ‡

* The notes of the cases were taken by Mr. George Mackenzie and Mr. M'Carthy from July 15th to August 9th, and by Mr. Dove and Mr. M'Carthy from that date to August 31st.

† The regulation, with respect to admission of extra medical cases into the London Hospital is, that all taken in after the visit of the physician of the day, are placed under the care of the physician of the next day.

‡ All these have, since this report was drawn up, been discharged cured.

FORMULÆ.

Mistura Astringens.
Decoct. Hæmatoxyli, half an ounce
Æther. Sulphur. 10 minims
Acid. Sulph. Arom. 15 minims
Camphoræ, 2 grains
Pulv. Capsici. half a grain
    Every fourth hour.

Mist. Antimon Tartar.
Pulv. Antimon. Tart. 2 grains
Magn. Sulph. half an ounce
Aq. half a pint
    Half-an-ounce every half-hour.

Lead Pill.
Plumbi, Acet., 2 grains
Camphoræ, a grain and a-half
Ext. Opii, one-sixth grain
Creasoti, one-sixth minim
    Dose : One pill every hour.

Creasote Pill.
Creasoti, 1 minim
Farinæ Tritici, q. s.
    One pill every hour.

Mistura Quinæ c. Ferro.
Quinæ Sulph. 1 grain
Tr. Ferri Mur. 15 minims
Aq. 1 ounce.
    Every two hours.

Grey Powder.
Hyd. c. Creta. 2 grains
Pulv. Ipecac. half a grain
Pulv. Doveri, two and a-half grains
    Night and morning.

The mortality in Table I., requires correction, as many cases were brought here in a moribund condition, as will be shown by Table II.

TABLE II.

SHOWING THE TIME FROM ADMISSION TO DEATH.

In this Table the upper line shews the number of cases in which death occurred at the periods indicated in the middle one. In the lowest the letter m stands for minutes, h for hours, and d for days.

No. of Deaths.	4	1	2	3	4	2	4	5	2	1	1	1	1	13	14	9	9	3	9	2	3	1	1	11
Interval between	15	2	3	4	5	7	8	10	12	15	16	18	19	1	2	3	4	5	6	7	8	10	11	16
admis. and death.	m	h	h	h	h	h	h	h	h	h	h	h	h	d	d	d	d	d	d	d	d	d	d	d

From this it will be seen that four cases died within a few minutes of admission, and ten more within six hours ; most of these might almost be regarded as virtually dead when admitted.

Again the influence of time is seen in the fact that the number of deaths diminished as the number of days' duration in Hospital increased. There was, however, an increase in the number of deaths of those who had been six days in Hospital, about which period of high reaction there appears to have been great mortality.

TABLE III.

MEDICINAL TREATMENT.

Treatment.	Number of Cases.	Died.	Living.
Mistura Astringens	48	31	17
Mistura Rubra (Water and Sugar)	56	28	28
Castor Oil	21	14	7
Saline Lemonade	20	6	14
Mist. Antimon. Tart.	2	2	0
Mist. Quinæ c. Ferro	3	1	2
Lead Pill	9	4	5

This account of the treatment refers merely to the stage of collapse; when reaction began the treatment was modified according to individual peculiarities.

The unenviable position which the Mistura Astringens occupies in the list, may be in part, if not altogether, due to the fact that all the cases at the commencement of the epidemic, when the type of the disease was unquestionably worse, were placed on that treatment (*vide* Table I.). This explanation seems the more probable, as at the Wapping Temporary Cholera Hospital this mixture was more successful.

In very bad cases the mistura astringens and castor-oil, after a few doses, produced such loathing, that the use of them had to be discontinued.

In the list of recoveries are included several mild cases of true cholera; and two patients, who were removed by their friends, of whom one was ascertained to have afterwards died; but at least between fifty and sixty were extremely bad cases, in which, either in collapse, or in reaction, the prognosis had been very unfavourable.

Baths, at a temperature of from 98° to 104° Fahr., were given, with most marked effect, in about 130 of the worst cases. In almost all the cases there was commonly, for a few seconds, difficulty of respiration; and in many, for about the same period, an unpleasant sensation of heat. In children, fright also contributed in causing some difficulty; but generally, in less than a minute, the good effects of the bath became manifest. Cramps ceased, anxiety of mind vanished, pulse returned, or, if originally to be felt, increased in volume and frequency. Many who had before moaned or shouted incessantly with pain, began to converse upon indifferent subjects, or in many cases sank into a tranquil slumber. Often recovery appeared to be the direct consequence of the bath, the improvement being permanent; but in many more, removal from the bath became the signal for the return, more or less rapidly, of the former symptoms.

The testimony of all who had a fair opportunity of judging, is unanimous as to the relief afforded by the warm baths, the most convincing being that of the patients, who, in some cases, craved incessantly for them, and remained in, at their own request, for nearly an hour at a time.

In a very few cases no relief was derived, but those were cases of great collapse, where their employment had been dictated by despair, rather than by any hope of benefit.

Incessant vomiting was one of the most distressing symptoms, continuing sometimes long after reaction had set in. All sorts of remedies were tried, among others, nutrient enemata, so as not to provoke any action of the stomach, but not with much success. In three cases the creasote pill proved of use; in one bismuth and hydrocyanic acid; sucking ice in many; and one child, aged 12, who vomited all fluids as soon as she had swallowed them, begged for bread-and-butter, which she ate with eagerness and retained.

The Mistura Quinæ c. Ferro was not used until a late period of the epidemic, but many of the cases, still in the Hospital, were treated with it, and

are doing remarkably well. Although it shares the fate of all other medicines, in being *apparently* all vomited up as soon as swallowed, yet some is retained and absorbed, as is proved by iron being found in the urine, and by the colour of the discharge from the bowels.

The Mist. Ant. Tart. was tried in two cases, one an old woman, aged 70, the other, a man, aged 66, but in full vigour of body. He was brought in in extreme collapse ; his temperature, on admission, having been the lowest observed in any of Dr. Clark's cases, 32·9° C., 91·22° Fahr. In neither case was there any sign of reaction before death, which took place in both instances on the second day after admission.

The saline lemonade was a considerable improvement on the Mistura Rubra treatment, and was much liked by the patients.

In the reaction stage, when the tongue had become dry and hard, Dr. Clark's grey powder was invariably used, with, in numerous cases, an almost magical effect in restoring the natural condition. In cases of relapse, when the tongue assumed the same appearance, the powder had similar success.

The free use of the Chlorate of Potash drink, and of the Saline Lemonade, and attention to the state of the bowels and to diet, was the general treatment pursued during this stage.

When patients passed into the sleepy state, with flushed face, congested conjunctivæ, and hebetude of mind, sinapisms or blisters to the nape of the neck were often very efficacious—the improvement being generally coincident with return of the excretion of urine.

Where severe headache was a prominent symptom from the first, cold irrigation was tried with some success.

TABLE IV.

AGE, SEX, STATE AT DEATH—(IN COLLAPSE OR REACTION).

Age.	Admitted.	Dead.	Male.	Collapse.	Reaction.	Female.	Collapse.	Reaction.	LIVING.	Male.	Female.
1-10	45	19	11	2	9	8	8	0	26	11	15
10-20	35	16	8	4	4	8	7	1	19	14	5
20-30	39	21	11	6	5	10	4	6	18	12	6
30-40	24	18	11	6	5	7	4	3	6	3	3
40-50	17	12	5	2	3	7	6	1	5	4	1
50-60	5	4	3	2	1	1	1	0	1	0	1
60-70	6	5	2	2	0	3	2	1	1	1	0
70-80	1	1	0	0	0	1	1	0	0	0	0
80-90	1	1	1	1	0	0	0	0	0	0	0
	173	97	52	25	27	45	33	12	76	45	31

In this Table " collapse " and " reaction " are used relatively, there being no well-defined limit to mark off the two states which, in many cases, merge insensibly the one into the other.

Strong reaction was characterized by sharply-defined patches of dusky

redness in the cheeks; highly congested conjunctivæ; a heavy sleepy aspect, with the vacant look of fever; eyes half-closed, with pupils turned upwards and inwards; dry, hard tongue, denuded of epithelium; sordes about the lips and teeth; very laboured respiration; and, especially in young lads and children, a preference for the prone position. Hebetude of mind, from which the patient could not be roused, and, in some cases, violent delirium accompanied this state, which usually proved fatal.

The local variations of temperature in this state were very remarkable, and would well repay the trouble of registering them, if thermometers could be contrived for the purpose. In one case, a child of 3 years, a space bounded by the supercilium, zygoma, inferior maxilla from the condyle to the symphysis, and the median line, conveyed to the touch the sensation of burning pungent heat, above and below those limits the surface being, apparently, below normal temperature. This variation was symmetrical on both sides. Such local elevations of temperature were observed in many cases. Dr. Clark suggests that they may have been caused by some corresponding affection of the vaso-motor nerve.

During the epidemic, the temperature in axilla, the rate of pulse, and the rate of respiration were registered, and with especial care for the last five weeks, when the diminished number of patients afforded the opportunity of more accurate and frequent observations. Some curious facts have been observed. There is no evidence to support the theory, that death in cholera is the result of the body having been cooled below a certain temperature. On the contrary, in one case of rapid death, within eleven hours from the first attack, notwithstanding that there was extreme collapse, the thermometer in axilla registered $36°$ C. $= 96·8°$ Fahr.

Again the thermometer proved that the temperature cannot be estimated with any degree of certainty by touch. In the case above referred to, the surface of the body felt very cold. And in another case, a young lad, the pungent sensation, on touching his hand, suggested the idea that he was very feverish, while at the same time the Thermometer in axilla registered $35°$ C. $= 95°$ Fahr.

The extremes of temperature noted were $32·9°$ C. $= 91°·2$ Fahr., and $40·9°$ C. $= 105°·6$. Fahr.

During the state known by us as "reaction" the temperature was often below normal throughout, sometimes even lower than it had been at an earlier period of the attack.

In some few cases it was taken per vaginam or per rectum. In one case there was a difference of $3°$ C. between the temperature in axilla and per vaginam, registered by two observers at two different periods. As the case progressed, the internal temperature fell, and the external rose until they both almost coincided in convalescence. Similar results, varying only in degree, were met with in all cases where the internal temperature was registered.

During favourable reaction there was frequently observed a remarkable

slowness of pulse, 54 per minute being a very general rate. In one lad, 9 years old, who was apparently doing very well, the pulse most carefully reckoned was 45 per minute.

In bad cases of reaction it often became intermittent; in one case, the seventh beat being invariably wanting. Nothing was found *post-mortem* to account for this.

As to respiration, nothing remarkable was recorded; the extremes observed were 12 and 44.

OBSERVATIONS ON COMPLICATIONS, ETC., ETC.

Roseolar rash.—In four cases during reaction a peculiar roseolar rash was observed. In the first, a lad of 17, it appeared on the hands after he had been allowed to sit up, and was considered convalescent. It consisted of small circular patches slightly elevated, disappearing on pressure, and again returning when the pressure was removed. It vanished from his hands in a few hours, then came out on his thighs and legs, and finally disappeared altogether within thirty-six hours from the first notice of it.

In the second case, that of a German sugar-baker, on the seventh day of his illness the temperature of the hands was observed by Mr. Dove to be 1°4. Fahr. higher than in axilla. On the next day a rash,-similar in appearance to the above-described, came out on the hands and arms. Both these cases recovered.

The next two were children, who suffered from extremely violent reaction. In one, a boy, the rash appeared on the eighth day after his admission, and the tenth of his illness; and in the other, a girl, on the tenth day of her illness. In both cases the rash was preceded by a sudden increase of temperature, which fell again to the normal standard as the rash disappeared. In both it came out on the hands and arms first, then on the body and legs. In the girl it became confluent. In both it disappeared on the third day. After it had disappeared, considerable œdema of the feet ensued in the case of the boy.

Spasms of the hands and feet.—The two cases, just alluded to, were extremely interesting, as they both became subject, after the rash disappeared to a peculiar continuous spasm of the hands and feet.

On the twelfth day, in the boy, and on the thirteenth day, in the girl, it was observed that the thumbs and fingers, which were themselves straight and rigid were at the metacarpo-phalangeal articulations flexed upon the palms, and the hands upon the fore-arms. There was an analogous affection of the feet. The spasms were similar in both cases, and no other part of the muscular system was affected. The boy seemed altogether ignorant of it: the girl complained of coldness in the hands, and of pain along the sides of the fingers; but as she never made any remark about her feet, it is not improbable that sight had some influence upon her sensations.

In the boy the spasm continued until death; in the girl, who recovered, it disappeared on the sixth day from the hands, and on the next day from the feet.

Glandular affections.—In one of the first cases admitted, which proved fatal, the sub-lingual gland of the left side became painful, and enlarged to the size of a pigeon's egg on the third day, continuing so until death.

In another fatal case, on the second day, the tonsils became enlarged and very painful, so as to materially interfere with deglutition. Both these cases had had small doses of mercury after reaction had commenced, but not sufficient to affect the salivary glands. Another fatal case suffered much from painful enlargement of the parotid and sub-maxillary glands of the left side.

In another, the boy referred to in the description of the spasm of the hands, both parotids became inflamed and suppurated.

In another the glandulæ concatenatæ became hard and painful. This case recovered. In the last three instances no mercury was given. All experienced great relief from warm fomentations.

Pregnancy.—Several cases were admitted with this complication. All in the early months of pregnancy aborted, and of those about full time three died undelivered, and one was delivered normally and recovered.

Cæsarian section was performed immediately after death on the three cases at full time ; but the children were all dead, as was also the one born at full time.

No case, where abortion had taken place, recovered.

Secretion of milk.—In four cases attacked with cholera while suckling, the secretion of milk continued undiminished, and proved very troublesome. No history of the baby becoming attacked was obtained in any case. Of course, mother and child were separated on the admission of the former into Hospital.

Noises in the head.—This was often one of the earliest symptoms. In one case it was actually the very first. A nurse, residing wholly in Hospital, who, for a fortnight, had been employed by day in the cholera wards, rose one morning in good health, and performed her customary duties until near mid-day, when she got " singing in her ears," soon followed by nausea. She lay down for an hour expecting that it would pass off. Vomiting then ensued, with purging, and soon after cramps. She rapidly passed into a state of extreme collapse, from which she never rallied, and so died within twenty-four hours. This woman had been particularly noted among her fellows for the nicety of her habits with respect to food, and for her personal cleanliness.

Another case, a young lad, complained much of the noise in his head, adding, moreover, that the sound of his own voice pained him.

This symptom was observed in many more instances, and was most severe in a Dutch Jew, who was nearly driven mad by it. He could not rest, and shifted his head from the top to the bottom of his bed every few minutes for about two days, apparently trying thus to escape from the ever-pursuing noise.

Affections of the eye.—In a large proportion of cases, when collapse or

reaction had been at all severe or prolonged, the following affection of the eye was observed. The vessels of the conjunctiva covering the sclerotic became congested, and the cornea dull. By no means the whole of the front of the eye was thus affected, only a patch elliptical in shape, the angles being directed towards the canthi. It usually included the lower third, at least, of the cornea. As the disease went on, there was a free secretion of muco-purulent matter from the conjunctival membrane, and the cornea became quite opaque, and in several cases ulcerated. The palpebral conjunctivæ were but slightly affected, and in no case was there any considerable swelling of the lids. This affection seems to have been caused by the patients lying with their eyes open in sleep, or during the stupor so frequent in reaction. The lower lid appeared to be drawn in by the shrinking of the tissues of the orbit, so that it required an effort to make the lids meet. Hence when volition was withdrawn, the eyes remained open, and the globe being turned upwards, the lower portion of the cornea came to be the part affected by exposure. Of course, the weakened condition of the patient increased the mischief, consequent on the want of protection.

The only treatment required was a weak alum lotion, and, in some severe cases, closure of the lids secured by the application of a pad of oiled cotton-wool. In only one case of recovery, that of a female child, aged two years, did this complication prove at all serious. Here both corneæ sloughed rapidly, at a late period of the disease, and total blindness has resulted.

Coryza.—The complication occurred frequently during reaction, especially in children.

Menstruation.—This continued unchecked in cases where it had commenced before the attack of cholera. In one case it came on during cholera, at the regular period, before reaction was established. In all females there was a muco-purulent discharge from the vulva, which in adults was stained with blood, even though it was not the menstrual period. In one case the quantity of blood in it was considerable.

Urine.—The following is a brief outline of the results of the examination of the urine of reaction and of recovery :—

Density.—The extremes were from 1005 sp. gr. to 1017, the average of all the observations being 1006. Even in cases where the suppression had continued for several days, and where afterwards the urine had to be drawn off, the density was remarkably low. We may here incidentally observe that frequently the secretion returned before the patient had regained the power of voiding it.

Acidity.—The urine was almost invariably acid. The acidity was greatest in that first passed in reaction. To this there were only two exceptions, of which one was urine contaminated by profuse discharge from the vagina.

Albumen.—In almost half the cases examined, albumen was present in varying quantities. Except in cases where there was reason to suspect old renal disease, this soon disappeared.

With nitric acid the urine, in many cases, gave a brilliant ruby colour, resembling that often seen under the same reaction in nervous disease.

Deposits.—Organic and crystalline.

In about one-third of the cases uric acid crystals and urates were found in considerable quantities. No oxalates were observed.

Organized deposits.—There was found, in most cases, epithelium from kidney, ureter, and bladder; and in the female, from the vagina, as if a general desquamation set in with reaction. Besides, there were found cells in various stages of disintegration, occurring separately, and often filled with granules like the " granule cell."

There were also casts which were of the following kinds, enumerated in their order of frequency :—Granular, hyaline, and rarely true epithelial.

There was, in all the specimens of urine, a remarkable proneness to decomposition at an early period, and to become full of the minutest forms of animal and vegetable life.

Discharges from the bowels.—The appearance of cholera stools, as they came from the patient, can be most fitly described as like " rice-water." This, on standing, separated into supernatant fluid, and flaky sediment.

The former was like milky water, with a slight tinge of grey, semi-transparent, and, in some cases, contained albumen.

The sediment consisted of flakes of coagulated mucus, having embedded in it numerous molecules and granules—many of them in active motion—and cells of various sizes, and in various stages of development or decay. Some resembled the colourless corpuscles of the blood; others were twice as large, and exhibited nuclei without the help of reagents; and some, filled with refractive granules, were undistinguishable from the well-known granule cell.

In addition to these were usually found well-defined cylindrical masses of granular matter, probably casts of follicles. In these nothing like a limiting membrane could be distinguished.

What is especially worthy of remark is, the almost uniform absence from the discharges during life of the normal epithelium of the bowel.

In several cases, as the disease progressed, the stools became tinged with blood, and this more and more deeply, until, in some instances, the discharge appeared to consist of pure blood. Such cases were always fatal.

Vomit.—This usually contained a good deal of buccal and pharyngeal epithelium, granular matter, and various vegetable cells from food.

It was intended to have added to this abstract an account of the number of cholera patients who had had premonitory diarrhœa, but this proved impossible. The question was asked with respect to each patient admitted, and the answer recorded; but later experience proved such answers to have been unreliable, as it was found that most opposite ideas were, in some cases, intended by the words used. One man complained of excessive purging, who was found, on inquiry, to mean that he had had no motion for two days. Again, numbers of labourers altogether disregard slight diarrhœa,

and seem to consider it as the acme of good health. Many cases, undoubtedly, were in good health until the very first onset of the attack of cholera. Two cases died in Hospital who had not been purged at all. Another had a fæculent motion, caused by castor-oil three hours before death, which took place eleven hours after the first attack.

At the beginning of the epidemic, special inquiry was made on each admission as to the water-supply, and the state of the drains, closet, and dust-bin of the house from which the patient had been brought. In two cases only was the answer unfavourable. In one of these the drains and closet were described as being in bad repair. In the other the water-butt was placed beneath the water-closet, and the contents of the former were contamirated by leakage from the latter. Such statements, however, are not very trustworthy.

Of all Dr. Clark's patients, twenty-seven had near relatives residing in the same house, either ill with, or dead from, cholera. From one family, five were admitted at the same time; from two other families, three each; from two others, two each; and in two cases mother and infant were admitted at the same time. These infants had previously been weaned. One individual only from each of these families is counted in the above list of twenty-seven.

In these cases the mortality was not great. Of the five, four recovered, and one died. Of the next three families, all recovered. Of the next, one died; of the next, both died; and of the next, the infant died and the mother recovered.

The subject of contagion will be referred to in a separate paper.

The arrangement of the cholera wards was such, that even at the time of the greatest demand upon the Hospital space, Dr. Clark's patients had each above 1000 cubic feet of air. Besides this, there were two lobbies communicating with the wards, which ought fairly to be included in the calculation, and would give nearly 12000 cubic feet more among the patients.

A list has been kept from the very commencement of the epidemic of all Dr. Clark's cholera patients, and most scrupulous care-taken to exclude therefrom all cases of diarrhœa, choleraic or simple.

Hence, all observations recorded in this abstract, were taken from genuine undoubted cases of cholera.

This may perhaps, in some measure, account for the high rate of mortality, as compared with that recorded in previous outbreaks of the disease.

NOTES ON VARIOUS SUBJECTS CONNECTED WITH CHOLERA, AS OBSERVED IN THE LONDON HOSPITAL.

BY F. M. MACKENZIE, ASSISTANT RESIDENT MEDICAL OFFICER.

I. *Thermometrical Observations.   On this subject I may venture to make the following general statements :—*

1st.—THE temperature of the body when taken by the thermometer in the axilla, rectum or vagina, will shew to some extent the degree of severity of the attack.

2nd.—The temperature cannot be estimated by the hand at all correctly ; this applies to the stage of reaction especially, and a great deal of care and time is necessary to get anything like careful and reliable observations.

3rd.—The temperature in the axilla will rise 2° Fahr. after a severe attack of cramps; this may be caused by the muscular exertion and consequent acceleration of the respiration at the same time.

4th.—The number of respirations, in a minute, and the temperature taken in rectum or vagina seem to have some relation to each other, the more hurried the respiration, the higher the internal temperature will be.

5th.—Cases in which the respirations are more than forty in a minute, and the internal temperature is higher than 101° Fahr., rarely recover.

6th.—The temperature of the body in roseola cholerica is raised in proportion to the severity of the eruption.

The following Table will give some idea of the temperature in a well-marked case of cholera :—

First Stage.

| Pulse 110, weak. | Respirations 20. | Temp. | in axilla | 95° |
| | | | in rectum or vagina | 98° |

Second Stage.

| Pulseless. | Respirations 38, laboured. | Temp. | in axilla | 94° |
| | | | in rectum or vagina | 100° |

Third Stage.

| Pulseless. | Respirations 44, laboured. | Temp. | in axilla | 97° |
| | | | in rectum or vagina | 103° |

Fourth Stage.

| Pulse 90, bounding and compressible. | Respirations 16, laboured. | Temp. | in axilla | 96° |
| | | | in rectum or vagina | 97° |

During the First Stage, that is, at the commencement of the attack, the temperature externally begins to decrease, lividity shows itself, and the internal temperature is about the normal degree, the pulse is generally weak, and cramps, vomiting, and purging are marked symptoms.

In the Second Stage, lividity is increased, the cramps are less, vomiting and purging continue of a rice-water kind, there is no pulse at the wrist, respirations are quick and laboured; the external temperature is rather lower than in the first stage, while the internal is higher than normal by about 2°. Collapse is now extreme; a large number of patients, especially those over fifty years, die in this stage.

The Third Stage is, I think, by far the most fatal. The lividity is not of the same tint in all; in florid persons it becomes a dusky-red colour, and in pale persons, it is a dusky-grey or stone-colour. The patient is comatose, while in the former stage he was wakeful and restless, a profuse perspiration covers the surface of the body, but is best seen on the face; the skin is hot and clammy; the eye-lids are semi-closed, and the conjunctiva thus exposed, is injected; the axis of the eye-ball looks upwards, the pupil is more or less contracted, unless the patient is roused; the pulse is not countable, or only just perceptible; the respirations are very quick and laboured; the external temperature rises to 97°, and the internal is 101°, or more. This stage does not last long; if well-marked the patient generally dies or passes into the fourth stage; the vomiting and purging are less, the purging is involuntary, if any. Frequently during this stage the motions are a pink blood colour, and when this symptom is seen the patient rarely if ever recovers.

The Fourth Stage is that of well-marked reaction, all the symptoms change, the patient assumes a too natural colour, with dry lips of a bright pink tint. There is vomiting and purging of an emerald-green colour, the stools gradually assuming a typhoid character; the skin is hot, harsh, and dry, with a glazed surface; the face flushed; respirations are slower, but still laboured, and the pulse is full, soft, and compressible. The external temperature is not so high as might be expected, it is, as a rule, below the normal 1° or 2°, this is so when the patient has a bright flush; the internal temperature is also lower than natural, about 1°. Patients in this stage frequently pass into delirium and die. Swellings of the glands in the neck may appear. Those who become convalescent, look very pale and anæmic.

The temperature, after death, depends on the length and severity of the attack. Patients who die during the second stage, and have a low external temperature during life, have a sort of reaction while dying, and after death the external and internal temperature rises to what it might have been, had they lived a few hours longer. The highest temperature, I have taken after death, was in a little boy; externally, it rose to 101·8; internally, to 106·2; this boy died in imperfect reaction. It is rare to find it as high as this; usually it will rise to 99 in axilla, and 102, in rectum. I cannot help thinking, that it depends on the duration of the illness alone, and not on

alteration of tissue or decomposition having commenced. If a patient has got fairly into the third, or critical stage, and then dies after living in it for a few hours, the temperature will not be found to rise, but, on the contrary, to fall a little after death.

Spasmodic movements, after death, also depend on the stage at which death takes place. They occur in severe cases which die in the second stage ; the limb that is cramped, during life, is found to be the one affected with spasm after death. They rarely, if ever, last more than thirty minutes. The greatest extent of motion that I have seen, has been the elevation of the elbow to about three inches above the surface of the chest, while the arm had been lying across it. I have not seen them in children at all.

TABLE I.

THERMOMETRICAL OBSERVATIONS TAKEN IN THE AXILLA IN CASES OF EXTREME COLLAPSE.

No.	Sex	Age.	Pulse.	Respiration.	Temp. in Axilla.	Subsequent Reaction.	Result.
1	M	25	None	36	94·2	Marked	Death.
2	F	53	—	44	94·4	Imperfect	—
3	F	32	—	32	94·4	Marked	—
4	F	40	—	40	95	None	—
5	F	24	—	40	93·6	Imperfect	—
6	M	5	—	36	95·2	None	—
7	F	28	—	30	92	None	—
8	M	16	—	32	94·4	None	—
9	M	11	—	30	93	None	—
10	M	9	—	32	94·6	None	—
11	F	26	—	36	92	Imperfect	—
12	F	20	—	30	93	Imperfect	—
13	F	30	—	40	96·4	None	—
14	M	24	—	32	93·8	None	—
15	F	25	—	42	94·2	None	—
16	F	35	—	40	90·2	Imperfect	—
17	M	32	—	32	94·6	None	—
18	F	26	—	32	95·2	None	—
19	F	50	—	40	94	Imperfect	—
20	M	38	—	32	93	None	—
21	M	58	—	50	94·4	None	—
22	F	20	—	32	94	Imperfect	—
23	M	17	—	40	95·4	Imperfect	—
24	F	30	—	42	94·2	None	—
25	M	30	—	30	93	None	—
26	M	35	—	40	94·2	None	—
27	F	32	—	30	93	None	—
28	F	20	—	60	97·2	None	—
29	M	40	—	40	94	None	—
30	F	36	—	40	91·6	None	—
31	F	50	—	30	93	Imperfect	—
32	M	40	—	36	94	Imperfect	—
33	F	25	—	34	91·8	None	—
34	F	39	—	40	92·2	None	—
35	M	2	—	36	94	Imperfect	—
36	F	60	—	44	93·2	None	—
37	M	69	—	40	94·2	None	—
38	M	30	—	38	93·4	Imperfect	—
39	M	68	—	48	93·6	None	—
40	F	40	—	30	94·2	Imperfect	—

TABLE II.

THERMOMETRICAL OBSERVATIONS IN THE AXILLA AND RECTUM, OR VAGINA, IN CASES OF EXTREME COLLAPSE.

No.	Sex.	Age.	Pulse.	Respi-ration.	Temperature in Axilla.	Temperature in Rectum or Vagina.	Reaction.	Result.
1	F	35	None	40	90·2	102·4	Imperfect	Death.
2	F	26	None	38	93·4	101	Imperfect	Death.
3	F	20	Weak	30	95·6	99	Fair	Recovery.
4	M	32	None	32	94·6	100·6	None	Death.
5	M	21	120 (weak)	32	95·4	100	Fair	Recovery.
6	F	13	Very weak	32	95·6	99·2	Good	Recovery.
7	F	26	None	30	95·4	101·8	None	Death.
8	F	25	Weak	28	92·2	99·2	Fair	Recovery.
9	F	43	None	29	95·4	99·2	Fair	Recovery.
10	M	24	Weak	30	94·2	100	Fair	Recovery.
11	M	17	None	48	95·4	101·4	None	Death.
12	M	35	—	40	94	101	None	—
13	F	32	—	30	93	102·8	None	—.
14	F	24	—	60	97·2	102·4	None	—
15	M	60	—	30	95	99	Imperfect	—
16	F	61	—	36	95·2	99·6	None	—
17	F	40	—	30	94·2	100	Imperfect	—
18	F	60	—	44	93·2	100·4	None	—
19	M	8	—	32	95	100·6	Imperfect	—
20	M	40	—	48	97·2	104·4	Imperfect	—
21	M	6	120 (weak)	36	96	100·4	Fair	Recovery.
22	M	51	None	38	91·4	100·6	None	Death.
23	M	12	None	48	94·6	100·2	None	Death.
24	M	30	None	42	96·4	99·8	Imperfect	Death.
25	F	5	130 (weak)	28	96	100	Fair	Recovery.
26	M	8	None	32	95	100·4	Imperfect	Death.
27	F	41	—	52	97·2	101·8	Imperfect	—
28	M	30	—	40	94·6	100	Imperfect	—
29	M	68	—	48	93·6	100·8	None	—
30	M	42	—	42	95	101·6	Imperfect	—
31	M	14	—	52	96·4	102·4	Imperfect	—
32	F	49	—	60	98	101·8	Imperfect	—
33	F	33	108 (weak)	24	94·2	100	Fair	Recovery.
34	M	13	112	30	95·2	101	Fair	Recovery.
35	F	12	132	28	96	99·2	Fair	Recovery.
36	F	40	None	36	94	100·2	Imperfect	Death.
37	M	19	115	28	96·4	99	Fair	Recovery.
38	F	5	98	26	96	99	Fair	Recovery.
39	M	29	132 (weak)	38	95·2	101	Imperfect	Death.
40	F	48	None	40	94	101·6	Imperfect	Death.

With reference to the Tables, I may state that the first dates from the commencement of the epidemic, till about the middle of it. It is intended to show the greatest decrease of the external temperature, and the increase of the respirations, during that period, in severe cases. It was thought at that time that a certain decrease of the external temperature would prognosticate a fatal result.

The cases in Table II. were taken during the collapse, with a low external temperature, an elevated internal temperature, quick respirations, and with little or no pulse. In both Tables, a great many who died, and are marked

with no reaction, had an elevation of temperature externally, as well as internally, while dying, and after death.

II. *Changes in the state of the skin.   Eruptions, etc.*

Some interesting and important changes take place in the skin and mucous membranes during reaction.   The skin, after losing its lividity in collapse, becomes, at first, natural in colour, then more red; the surface is dry and has a glazed appearance, the whole body is of a brick-dust colour, and the face is flushed.   The skin is also, at the end of reaction, liable to eruptions. I have seen, during the epidemic, nine cases of roseola; only twice has urticaria been noticed, and herpes twice.

Roseola cholerica appears to occur at all ages, but rarely in old persons; it is generally best marked in children.   The rash is usually noticed in the morning by the patient on the wrists and arms; it then takes the following order :—wrists, fronts and backs of arms, hands, (in the palms and backs in children, face, eyelids, chest, buttocks, back, abdomen, thighs, legs, and feet. It is found to make its appearance between the seventh and tenth day after the first symptoms of cholera; it lasts three days generally, but it may exceed this.

It may be either in large irregular patches, or discrete.   It is generally well marked on face, arms, buttocks, and thighs, but less so on the back and chest; in the latter regions it is dotted here and there, and less bright in tint; it has an elevated base, and when it first appears in young children, often resembles urticaria.   In one case this was especially noticed that the patches were like those that might have been produced by the stinging-nettle; a white halo surrounded each, and in the centre, of the then pink patch, was a white spot; the child rubbed it a good deal, and was very restless.   After twelve hours had elapsed, the patches were less elevated, of a bright scarlet colour, no white spot in the centre, but a white halo still occupied the spaces which were not covered by the rash; it had altered to a pure case of roseola.

The rash itched a good deal, but on no patients were there any marks of scratching seen after the rash had disappeared. It is generally accompanied by feverish symptoms, thirst, hot skin, quick pulse ; plenty of urine, of low specific gravity, without albumen, and of acid reaction.

The external and internal temperature are always raised whilst the rash is out.   In a girl, in whom the rash was profuse, the external temperature was 101°·6, and the internal was 102°·4.

As the rash fades, the skin on prominent parts of the body, begins to desquamate ; in this respect it is very similar to the epithelial desquamation of scarlatina.

This eruption frequently came out during delirium, and was attended by swelling of the glands of the neck.

The delirium was generally milder as the rash began to fade, and patients expressed themselves as being much better at this period, in every

case. In no case had opium been given internally. Three had the turpentine mixture, two the calomel treatment, one castor-oil, and three had no internal remedies.

Urticaria makes its appearance at about the same period that roseola does. It is not so profuse, but in larger and solitary patches. It itches considerably, and fades, but may re-appear. Roseola also apparently faded for some hours in the day, and burst out strongly towards the latter part of the evening. Urticaria did not last more than two days, and only appeared occasionally during that time.

Herpes was noticed on the face twice in cholera patients, and once severely in a case of severe diarrhœa. In one cholera patient it appeared on the tenth day; the upper lip was a little swollen the day previous. The patch of vesicles was three-quarters of an inch distant from the mucous membrane of the lip, above the left angle of the mouth. The patient recovered; there was no history of a rigor having been observed.

A man about 45 years of age, who had "acne rosacea" of the nose, died with gangrene of that organ.

III. *Affections of the mucous membrane.*

The skin and mucous membranes are inclined to suppurate or inflame (especially where there are abrasions or sores), in the stage of reaction.

The mucous membrane of the eye, *i.e.*, that part which is exposed by inability of the patient to close the lids, becomes, at an early stage, in reaction, injected, and a secretion of mucus is found on the surface of the cornea, and sclerotic, or in the inner angle of the eye. This secretion often is a trouble to children, in whom it is excessive.

The mucous membrane of the mouth and lips often becomes sore, and the gums look spongy. There are small vesicles on the mucous membrane of the lips and tongue, about the size of a pea, or smaller. Patients also complain of sore-throat when swallowing. This apthous condition of the mouth was noticed in almost all the cases of roseola cholerica.

A severe pain in the epigastric region is a very prominent symptom at the period of reaction.

Bronchitis is not very uncommon; it occurs towards the end of the reaction stage, and some patients die with it. It has been noticed also, by Dr. H. G. Sutton, in a certain number of *post-mortem* cases, that the patients have died with capillary bronchitis. On examining the lungs, the larger tubes are not found much affected, and on opening the bronchial tubes with a fine pair of scissors, it is noticed that there is little, but not much, pus; but by making a section of a piece of lung, and squeezing it, a thick creamy pus, apparently airless, oozes out of the minute bronchial tubes. This is known to be one of the most fatal forms of bronchitis. In one case it was especially noticed that the patient was expectorating a matter like pus totally free from air-bubbles, and, on inquiry, the patient had no marked cough, and did not complain of shortness of breath. Air was heard to

enter freely into his chest, and no crepitation, but the rapidity of the breathing was increased, being 32. It is also not uncommon to notice a muco-purulent fluid in the larger tubes of patients who have died in reaction.

The mucous membrane of the labia becomes also inflamed. This is noticed in girls ; the labia are red and swollen, and their mucous surface is covered with a pus-like discharge. In women, a pink discharge, similar to that of the menstrual period, has been found ; it lasted three days or more, and ceased without treatment. It has been noticed, in *post-mortems* on these cases, that the mucous membrane of the uterus is congested as if in the process of menstruation.

IV. *Ulceration of the cornea.*

Ulceration of the cornea is very rare. I have seen only three cases ; it occurs in the very young only. It was noticed in an infant three months old, and from that age to three years.

At the very end of collapse, and commencement of reaction, the patient lies in a comatose state, with the eyelids semi-closed ; a quantity of mucus secreted on the conjunctiva, or collected at the inner angle of the eye.

The eyelids may remain open for three or more days, without once covering the eye ; the axis of the eye-ball looks upward, leaving the lower third of the cornea exposed to the air, dust, etc.

Previous to the ulceration commencing for three or four days, there is, apparently, a layer of opaque lymph covering the exposed surface, more or less. On attempting, in one case, to remove it with the corner of a sponge, I failed, and found it quite adherent, especially over the cornea. On the next day the part of the cornea covered was commencing to ulcerate. The film had separated, leaving a shallow ulcer.

The ulcer is generally crescentic in shape ; the outer convex border being nearly at the margin of the lower edge of the cornea ; the upper one, or concave edge, corresponding to the margin of the upper lid.

The ulcer may perforate, and follow the same course that ulceration of the cornea does in small-pox, etc. In one case the right eye only was affected.

It will be interesting to see if cataract follows these cases, as it frequently does in those from small-pox.

The infant of three months old died ; the other two children lived. The ulcer healed in a month's time after its first appearance.

The pupil, in cholera, varies a good deal ; but it is certain that, in adults, during collapse, it is not widely dilated as in the cold stage of ague.

During the comatose stage, at the end of the collapse, and commencement of reaction, the eye-balls are turned upwards, the eye-lids are semi-closed, the pupils are then contracted more or less, though not minutely. In this state they do not act ; but on rousing the patient the pupils return to their normal size, but are not sufficiently active.

Atropine and calabar bean have the same effect on the pupils during collapse, that they would have in a normal condition.

The fundus has been examined with the ophthalmoscope, by Dr. H. Jackson and myself, but nothing very important was seen. The retinal veins appeared much distended, and were of a deeper colour than normal, and the artery did not look unnaturally small.

Nothing definite could be determined on, as to tension of the eye-balls.

NOTES OF SIX CASES OF CHOLERA WHICH OCCURRED IN NURSES OR INMATES OF THE HOSPITAL.

BY MR. BATHURST DOVE.

It is thought best to give the cases, bearing on this subject of contagion, as fully as possible; facts regarding such a difficult topic being more valuable than theories or conjectures.

Out of somewhat under 130 persons engaged in attending the cholera patients and washing the sheeting, etc., from the cholera wards, seven were attacked by cholera; of these five died. In addition, one patient, a child occupying a room adjoining one in which there were cholera cases, died of it. Three others had tolerably severe diarrhœa, and one had an attack of pain in the abdomen, with cramps in the legs, without diarrhœa.

This calculation makes the deaths amount to 4·6 per cent. of those engaged in the wards, etc. During the five weeks ending August 11th, the period during which all these cases occurred, there were (counting the fatal cases in the London Hospital, many of which were brought from other districts), 510 deaths from cholera in Whitechapel, the population being in round numbers, 7600. Thus, deaths from cholera in Whitechapel were 6·7 in the thousand. Those amongst attendants on cholera patients in the Hospital (including one patient under nearly the same condition as to contagion), were forty-six in the thousand. It will be observed, however, in the reports, that many of the nurses resided out of the Hospital.

The following are the notes of the cases above referred to :—

Case I.—McC., æt. 27, a widow, had attended as assistant-nurse on cholera cases from the 12th of July to the time of her seizure. She lodged at a house in Samuel Street, St. George's, East. On July 18th, she was attending on a fatal case of cholera in which there were fœtid emanations from the body before death. Not feeling well, she took, of her own accord, a dose of salts and senna. This purged her severely. On the 19th she was admitted as a severe case of cholera. She became livid, had cramps in the limbs, excessive purging, of the characteristic stools,

and violent vomiting. She died on the 25th July of pneumonia during reaction. The house she lived in appears a tolerably healthy one. No other case has arisen there, or in the immediately surrounding houses. In the same house two children have since had slight diarrhœa.

CASE II.—B., æt. 28, only recently hired, lodged at 12, Newcastle Place, Mile-end-Road. She was in the fourth month of pregnancy—a fact which she had concealed when she was engaged as night-nurse. It is thought she had been in want for some time past. On the 27th of July, after having been about three nights on duty in the cholera wards, she had an attack of vomiting and purging ; but got better, and remained so up to the 29th. On that day the symptoms returned with the addition of cramp in the limbs. She rapidly passed into a state of collapse, aborted on the night of the 1st of August, and died the next day.

CASE III.—P., æt. 41, widow, only taken on, within a few days, as assistant night-nurse in the cholera wards. She stated that she had been a nurse of cholera patients in a Dublin Hospital during the epidemics of 1848 and 1854. She had lodged two days at 13, Lisbon Street, Cambridge-heath Road, a street in which there were afterwards many bad cases ; but as far as can be ascertained, this was the first which arose there. Her previous residence is unknown. She had been out of employ for some time, and is thought to have been living hard. She was on duty during the night of the 27th of July, and left the Hospital about 9 A.M. of the 28th. At 11 A.M. she was seized with purging, followed by vomiting, and cramps, and at 7.30 P.M. was brought in livid, cold, with pinched features, no pulse, and whispering voice. She died next day in collapse.

CASE IV.—C., æt. 40, laundry-woman, had been employed here nineteen days. She lived out of the Hospital, and was one of ten women employed in washing the sheets, etc., from the cholera wards. Before this she had got chance work at various laundries. She is said to have been very particular in washing her hands before eating, etc. In Dr. James Jackson's report will be found an account of the precautions taken for the disinfection of the linen.

On Friday, the 27th of July, C. got an attack of diarrhœa, and left work for part of the day. On Saturday and Monday she was better, and did her work as usual. Tuesday morning, 31st of July, the diarrhœa returned, and in the afternoon she got cramps in the limbs. She was admitted into the ward at 5 P.M., with all the symptoms of cholera, and died next day in collapse.

CASE V.— H., æt. 40, came here from Rochester, and slept in the Hospital from the first. She had been an assistant-nurse in the cholera wards since the 23rd of July, and is known to have had no friends near enough for her to visit during her "hour out" each day, and she only went out for that

time. She was taken at twelve at noon, on August 5th, with purging and vomiting, having before complained of singing in the ears. Cramps, lividity, and purging soon became extreme, and she died next day in collapse.

The cases of diarrhœa require no further mention.

It will be noticed that all these cases were rather sudden in their accession, and very rapid in their course. The patients were all so ill when admitted, that few questions could, with propriety, be asked them, and, therefore, many interesting facts are unascertained.

CASE VI.—In the case referred to, in which cholera attacked a patient in the Hospital, the subject of it was a child, æt. 2, who had been sent to the medical attic, because it had measles whilst in the surgical wards of the Hospital. The first cholera cases were placed in the next room. Within three days the child was attacked by cholera, and died in a few hours in collapse. He had a convulsion before death.

CASE VII.—E. J., an assistant-nurse, volunteered for the cholera ward, on July 21st. She concealed the fact that she had had a slight diarrhœa for several days, but on July 25th, passed into well-marked cholera. She had slept in the Hospital, but had once during the time been out to visit a friend in a cholera district. After a severe attack she eventually recovered. These facts are abridged from Mr. F. Mackenzie's notes.

The above cases suggest, amongst other things, that it would be well for the nurses employed in cholera wards to be seen and questioned, by a medical man, as to their health every time they went on duty. And, should additional facts show that those attending cholera cases are more subject to the disease than others, it would be well that, as far as possible, they should live in some place where precautions could be taken to prevent the spread of the malady amongst the surrounding population, if any of them should take it.

REPORT OF CASES TREATED BY THE INTRODUCION OF FLUIDS INTO THE VEINS.

BY MR. LITTLE,

ONLY patients with no apparent chance of recovery have been injected, cases of extreme collapse, all of them pulseless at the wrist; livid, with low external temperature, and having lost quantities of fluid, either by purging or vomiting, generally by both. The fluids used were defibrinated blood, serum, salines, and salines with alcohol.

The blood used was sheep's, kept warm by placing the vessel containing it in hot water, defibrinated by whipping, and strained.

I used defibrinated blood, at the request of Dr. H. Jackson, but only in two

extremely bad cases. It had no favourable influence even temporarily, and seemed to embarrass and hurry the respiration. The cases were such, that no conclusion, either way, can be drawn as to the use of blood.

The serum used was also from sheep. The blood was left to separate, and the serum poured off after four or six hours. 1 injected it with the idea that it would be more permanent in its effect than the saline fluid, as it contains the salts and water, with nutritive material in addition. It was only used in two cases, from the difficulty in having it ready at the right moment.

In the first case, the serum was mixed with saline fluid, as there was not enough of it. Seventy ounces were injected, with no effect: the patient was, however, moribund at the time.

In the second case, forty ounces of pure serum were injected, with good effect, so much so, that I thought on the day after, the patient might recover ; his age, 64, was probably fatal to him. (See Table, Case 12.)

The saline fluid used, consisted of,—

> Chloride of sodium, 60 grains.
> Chloride of potassium, 6 grains.
> Phosphate of soda, 3 grains.
> Carbonate of soda, 20 grains.
> Distilled water, 20 ounces.

In most of the cases, and in all the successful ones, two drachms of pure alcohol to the pint of water were added, the proportion used successfully by Dr. Little in 1849. It was injected at a temperature of 110°, or very nearly so, as it cooled somewhat whilst passing through the apparatus. In the earlier cases the syringe, depicted, p. 137 of this volume, was used. Subsequently, I attached an india-rubber tube, with a nozzle at one end, to a funnel, and allowed the fluid to flow in by gravity.

The apparatus figured, has been employed in the last few cases ; with it the whole operation can be easily performed by one person, and in it the fluid can be kept at the right temperature. It consists simply of a vessel holding forty ounces, with a lamp underneath, a thermometer hanging within, and a tap near the bottom, from which proceeds four feet of thick india-rubber tube, with a silver nozzle at the end. It was found that when this instrument was placed at the bedside, about on a level with the patient's head, and the nozzle inserted into a vein at the bend of the elbow, its contents flowed into the vein in about ten minutes. With it the operator is free to take observations, and has only to watch the temperature of the fluid. I think the apparatus might conveniently be larger, so as to contain enough for each operation. In the more successful cases eighty ounces were introduced at a time, generally in between twenty minutes and half-an-hour.

The bend of the elbow was the site selected ; there was generally little difficulty in finding a vein, but sometimes none was visible through the skin. I found it best to expose the vein, and pass a probe under it, before opening it. The fluid from the apparatus being now turned on washes away any

blood issuing from the opening, which the operator can then clearly see, and
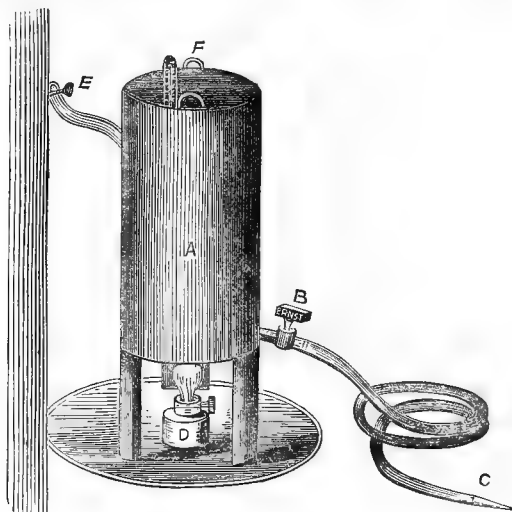
A. Vessel.
B. Tap.
C. Nozzle.
D. Spirit lamp.
E. Fastening to bed-post.
F. Thermometer.

runs little risk of pushing the nozzle into the cellular tissue, or up the sheath of the vein.

The immediate consequences of the operation were to restore the pulse and voice, improve the colour, relieve the epigastric suffering, and lessen the frequency and difficulty of respiration.

The secondary consequences were a rise of temperature in the axilla, and generally a fit of shivering, profuse perspiration, and cessation of thirst, cramps, and vomiting. After a period varying from an hour to ten, in the more successful cases, the collapse returned, and the patient was reinjected, but before he became as bad as at first. The operation sometimes required to be again repeated. The patients had little or no reactionary fever, were at once in a state of convalescence, and were fed up with eggs and brandy, beef-tea and arrow-root. The symptoms taken as indications for injection and reinjection, the consequences and treatment are better seen from the detailed cases which follow :—

TABLE OF CASES TREATED BY THE INTRODUCTION OF FLUIDS INTO THE VEINS.

No.	Age.	Sex.	Hours ill	Before Injection.				Ounces Injected	Fluid	After Injection.				Death in hours.	Recovery.	
				Tem. in axilla	Tem per rect.	Pulse.	Respiration.			Temp. in axilla	Tem. per rect.	Pulse.	Respiration.			
1	49	F	8	92·2		None		40	Saline	93·5		106		2		
2	34	F	13	93		—	40	40	—	93·5		120	44	4		
3	40	F		94		—		40	—	98		96	40	9		
4	40	M	40			—		12	Blood			..		8		
5	50	M	8			—		9	Blood					2		
6	20	F	9	93		—		50	Saline	99		138				1st Injection.
			14	96		—		50	—	97		120				2nd ,,
			21	96		—		50	—	96		140	•	24		3rd ,,
7	40	M	9	92·5		—	38	40	—	94		120		2		
8	32	M				—		70	Serum					4		
9	8	M	10	97·2	100	—	38	30	Saline	98·6	100	130	32	96		1st ,,
10	28	F	22	92·2	101	—	42	50	—	98·6	100	98	36			2nd ,,
			23	95·2	100	110		70	—	95·2		110				3rd ,,
			35	94		130		50	—	102·6		104			R	
11	30	M	26	96		None		50	—	97·4		100		144		
12	64	M	11	95		—	35	40	Serum	100		120	40	52		
13	20	F	13	93	98·2	—	36	50	Saline	98		98	34			
			18	94		—	38	70	—	97		100	34		R	
14	40	M	8	95	100	—	40	80	—	99·4	100	100	32			1st ,,
			18	96		—	38	80	—	102		120	28			2nd ,,
			27	96		—	30	80	—	100		120	24		R	3rd ,,
15	35	F	13	93		—	30	80	—	97		100	22		R	
			21	95		108	32	80	—	98		104	26		R	

In the Table, "Hours ill" means the time, since the setting in of urgent symptoms, irrespective of any diarrhœa which may have preceded the attack.

The column headed "Death in hours," contains the time in which death took place after first injection.

The details of most of the fatal cases are sufficiently given in the Table, they were moribund at the time of injection, and it merely failed to save them. It was marvellous how, to a patient already comatose, and apparently drawing his last breath, consciousness and speech were restored, and a belief in his own recovery. Judging from later experience, I think one or two might have had a chance with larger and repeated injections. It is, however exceedingly arduous, to watch the cases day and night, so as to be always ready at the right moment to repeat the operation when necessary.

CASE IX.—*Injection of salines. Improvement. Death on the third day.*

W. L., aged 8, admitted at Nine A.M., August 18th, was taken ill at four A.M., with purging, vomiting, and cramps in the feet and hands. When admitted, he was cold, almost pulseless; respirations 36. At two P.M. he was worse in aspect and voice, choleraic ; no pulse ; eyes sunken, half closed, with dilated pupils. A thrill was audible at the end of each inspiration, which was felt at the upper part of the left hypochondriac region. The temperature in the axilla was ninety-seven, in the rectum one hundred. Thirty ounces of saline alcholic fluid were injected in half-an-hour. The pulse

H H

became perceptible, and increased to 130. His colour improved, and he spoke plainly, and felt better.

At three P.M. temperature in axilla 98·6, in the rectum one hundred; pulse 150, respiration 32. He was once purged; was in a profuse warm perspiration. At 10 P.M. he was pale; pulse 120; respiration 24; takes brandy and egg, no sickness.

August 19th, eight A.M.—Warm, with weak pulse, slight purging, no vomiting.

At twelve, noon, a coloured stool, slightly delirious.

August 20th, eight A.M.—Slight purging continues; is flushed, delirious, and excited when roused; respiration 24, pulse 110; is pale. Passed urine twice to-day.

21st, eight A.M.—Is very restless, respiration laboured, no pulse, surface cold. Death at half-past two P.M.

Twenty minutes after death the temperature in the axilla was 99; in the rectum 102·4. One hour later, in the axilla, 95·4; in the rectum 99·2. Rigor mortis well marked.

Case X.—*Injection of salines—improvement—relapse.   Reinjection— improvement—relapse.   Reinjection—recovery.*

D. H., aged 28, married, a stout German woman, admitted August 29th at twenty minutes to eight A.M. Taken ill with purging and vomiting of rice-water at twelve last night, has had no premonitory diarrhœa. Her aspect is choleraic, eyes sunken, lips livid, pulse scarcely perceptible. Vomits constantly; has severe cramps in the belly and legs; respiration quick.

At twenty minutes past eleven, much worse. No pulse. Temperature in the axilla 92·2, in the vagina 101; cramps are frightful.

At two P.M. fifty ounces of saline alcoholic fluid were passed into the right median basilic, by gravity, in fifteen minutes. The pulse at once returned, at 98, the cramps lessened. Temperature in axilla 9·52, in vagina 100.

Immediately after the injection she had a rigor, so severe, that her teeth chattered, and the bed shook. Hot brandy-and-water was given her, which she kept down. In another half-hour she got worse again, the pulse weaker, and at twenty-five minutes past three, seventy ounces of the same fluid were introduced into the vein on the opposite side, the pulse improved immensely, she had little pain, and talked freely. Temperature in axilla at four P M., 102·6.

Seven P.M.—No pain, no cramps, no sickness; has been purged four times since two o'clock, takes fluid food. Pulse full, 120; temperature 100; profuse perspiration; she was placed on a hot-water bed.

Half-past Ten.—Temperature 96·2; is easy. Midnight, slightly sick.

August 30th, four A.M.—Pulse 120.

Half-past six.—Temperature 94; pulse very small and very frequent. Fifty ounces injected into left arm. Afterwards pulse strong and full, 104. Aspect good, lips red. Has had seven more uncoloured stools. Temperature

96 ; vomits slightly ; shivers so that teeth chatter ; temperature rising. Takes hot brandy-and-water. Quarter to eight, pulse good, 140. Half-past nine temperature 100. Half-past tén, temperature 99·2 ; pulse 130. Three P.M., temperature 97·2. Seven P.M., temperature 97 ; pulse 96.

August 31st.—Going on well, complains only of headache. A blister was applied to the neck and gave relief. Takes fluid food, and ten drops of aromatic spirits of ammonia, every half-hour. She went on convalescing slowly ; her first urine was passed, September 2nd, at four A.M. (there had been none for one hundred hours). She is now, September 17th, up. Diet, chops and wine allowance.

CASE XI.—*Injection, convalescence, relapse. Death on the sixteenth day.*

W. L., of Shadwell, a small, weakly man, the father of the subject of Case IX., was admitted August 29th, at ten A.M, Was quite well until twelve last night (though his bowels have been rather loose for three weeks), when he was seized with continuous purging of stuff like slaked lime. Has not vomited but felt sick, has made water this morning. On admission his eyes were sunken, but the skin was warm, the pulse fair, the tongue foul. At twelve noon, surface cold, pulse feeble, respiration hurried ; has severe cramps in the legs and belly; no purging, vomiting, or passage of urine. At two P.M., much worse, he is scarcely sensible ; voice very choleraic, a faint whisper. Temperature in axilla 96·4. Fifty ounces of saline alcoholic fluid were injected into a vein at his elbow, after which his pulse was good and his temperature rose, and his breathing was easier. At seven P.M. has been purged three times, profuse perspiration; is sleepy; pulse good, 120; temperature in axilla 99·4. Has had no cramps since the injection, takes beef-tea.

August 30th, twenty minutes to seven A.M.—Pulse 94, soft and full; temperature 97·8. Has passed five brownish fluid motions, during the night, and been sick twice. Feels comfortable, looks convalescent, and takes food. Six P.M., temperature in axilla 97·4, pulse 88.

August 31st.—First urine at three A.M., is quite convalescent.

September 1st.—At two A.M. was much frightened and shocked by a patient with delirium tremens, who was being removed from the ward at six P.M., was prostrate, much purged, and almost dying, not livid or choleraic. At half-past one much the same; four stools to-day; ordered saline, and brandy enema every two hours ; he keeps them up. Takes beef-tea and brandy-and-water.

September 2nd.—Rather stronger, still slightly purged.

3rd.—A little better.

4th.—Worse again, has been frequently purged, aspect choleraic, eyes sunken. Begs not to be injected again ; has taken astringents and chalk without effect on the purging. Diarrhœa at two P.M. The *post-mortem* examination presented no peculiar appearances, with the exception of very large kidneys, but apparently healthy.

CASE XII.—*Injection of serum—improvement—relapse. Death on the third day.*

Thomas C., aged 64, of Spitalfields, was admitted on the morning of August 31st. Had had looseness of the bowels for a fortnight or more; taken at three A.M. this morning with purging and vomiting of a rice-water character, and severe cramps in arms, legs, and belly. On admission, his his aspect was choleraic; lips and hands livid; pulse perceptible. At half-past two much worse; temperature in axilla 95; hands much shrivelled and blue; no pulse; vomiting most profuse. Forty ounces of serum, from sheep's blood, were injected; the serum was from the blood of a sheep killed that morning. After the blood had stood six hours, the serum was poured off and filtered. After the operation the patient had a most severe, violent, and prolonged rigor. Hot brandy-and-water was given him, and he was placed on a hot-water bed. At six P.M. he was sweating profusely, was not sick, had no cramps, colour good. Temperature 101·2 in axilla. Takes warm fluids readily. Seven P.M.—Sleeps, no cramps, vomiting, or purging, since the injection. Half-past eleven.—Has slept, off and on, and had one rice-water stool.

September 1st.—Going on well; two stools; temperature axilla 99; takes fluid food.

2nd.—Not so well, breathing hurried. Two P.M.—Respirations 55; pulse good, 130; is dying. Death at eight P.M.

An examination of the body was made sixteen hours after death; there was no congestion about the heart or great vessels, but the lungs were filled with blood, particularly their bases. The intestines contained a quantity of brownish fluid, and there were ulcerations of Peyer's patches. The bladder contained two ounces of dark urine. On examination of the blood with the microscope, the discs seemed more plump than usual, none were broken. This patient was doing so well on the second day, that I thought he would recover. He died in reaction.

CASE XIII.—*Injection of salines—improvement. Relapse—reinjection—recovery.*

M. I., æt. 20, of Hackney, admitted at half-past four P.M., on the 31st of August: taken ill at six A.M., with purging and vomiting, cramps in the legs and belly—no urine since last night. On admission, her surface was cold, aspect somewhat choleraic, pulse very small. She was put on the calomel treatment, with large doses. Quarter-past eight P.M.—Much worse, continuous rice-water purging and vomiting; pulse only perceptible, now and then; temperature in axilla 93, in the vagina 99. She got worse, and at half-past two A.M., on the 1st of September, had no pulse; hands and lips were livid; and fifty ounces of saline alcoholic fluid were injected with good result. At three A.M., temperature in axilla 98. She had a slight rigor after the injection. At half-past seven A.M., no pulse, respiration 38, temperature 94,

so seventy ounces were injected into the same vein. A larger quantity was put in this time, as improvement did not take place so rapidly. She vomited after the first pint; and, at the close of the operation, her temperature had risen to 97, her pulse was restored, and her respiration had fallen to 34. At nine A.M., in profuse perspiration, feels well. Seven P.M., has felt well all day; no purging or vomiting; temperature in axilla 97; pulse good; arms and hands cold and wet from sweat; was placed on hot-water bed; takes fluid food readily.

September 2nd.—Much better; has a headache, a blister was put to the back of the neck, and she was relieved in half-an-hour.

3rd.—Convalescent.

19th.—Is strong and well, and is to go into the country.

CASE XIV.—*Injection of salines—improvement. Relapse—reinjection—*
Relapse—reinjection—recovery.

J. S., of Whitechapel, aged 40, admitted September 10th, at quarter to nine P.M.; has been living badly, and out of work lately; was taken ill at six P.M., with purging and vomiting of a rice-water character, and cramps in his limbs. When admitted he was cold and pulseless; lips and hands livid; cold perspiration on the forehead; no voice. No urine since the morning; temperature in axilla 96.

September 11th.—Two A.M., worse, lips and face awfully blue; hands also, as blue as any patient that has been in the Hospital; vomiting and purging, profuse; temperature in axilla 95·2; eighty ounces of alcoholic saline fluid introduced in fifteen minutes. At the conclusion of the operation, breathing easier; pulse 100; temperature in the axilla rose to 99·4, with a slight rigor; likes hot brandy-and-water. Half-past eleven A.M.—Has had one small stool since injection; no cramps or pain; voice a faint whisper; no radial pulse; carotid 120; temperature 96. At noon, eighty ounces were again put into his veins, with immediate improvement; says "he breathes freer;" is lively and talkative; hopes I shall reinject him if he gets worse; lips natural colour, face pale. One P.M., has had no rigor, but says he feels cold; temperature in axilla 102; some purging continues, but no vomiting. Two P.M., in a healthy sleep; respiration 96, pulse 90. Six P.M., profuse perspiration, tongue cold; says he is hot, pulse small. Nine P.M., no pulse, aspect choleraic again: eighty ounces were again introduced, after which he improved wonderfully; said he was sleepy and went to sleep.

12th.—Has not slept much, but was rather delirious; takes food; is much better; talks freely; pulse 98, temperature 98, respiration 26. Quarter-past eight P.M.—One stool since the morning, no sickness, takes his food well; respiration 20, pulse 120, temperature 97.

13th.—Has had two or three slight shiverings, but feels warm; no purging or vomiting—first urine to-day.

19th.—Has gone on improving—is now convalescent.

CASE XV.—*Injection of salines—improvement. Relapse—reinjection—recovery.*

M. H., aged 35, a thin spare woman, was admitted September 11th, at ten A.M.; has had looseness of the bowels for two days. Was taken ill in the night with rice-water stools, and cramps in the legs and belly. On admission, the choleraic aspect was extremely marked; respiration 30, pulse scarcely perceptible; has passed no urine for two days. Ten minutes to twelve A.M.— Pulse sometimes perceptible, about 80; lips, tongue, and hands livid; voice very feeble; vomits much; no purging since admission; the abdomen is dull, and contains a quantity of fluid, which rattles when shook. Half-past one.— Collapse extreme; temperature 93; no pulse; could not be roused to consciousness; eighty ounces of saline alcoholic fluid were injected. As the injection proceeded, consciousness and voice returned, and a pulse at 100; the breathing became easier and less frequent, and she talked, and wanted to know how she got ill. At two P.M., she vomited, and was purged for the first time since admission; temperature 97. Six P.M.—Profuse perspiration; pulse scarcely perceptible. Nine P.M., collapsed again; temperature 95; eighty ounces were again injected, with only slight immediate benefit, but in half-an-hour the pulse became fair, at 104; temperature 98.

September 12th.—Ten A.M., pulse good, patient much better altogether; surface warm, aspect natural; has slept well, and taken two ounces of brandy. Quarter-past three, doing well; pulse 96, respiration 24; no motions, vomits when she takes food.

13th.—One A.M., complains of pain in the belly, is rather restless, has headache: ordered, turpentine to the abdomen, and effervescing saline mixture, with hydrocyanic acid. Ten A.M.—Six ounces of urine drawn off; pulse 96, respiration 25.

19th.—Has gone on improving, and is now convalescent.

In concluding this hurried report, I may state my conviction that a patient (if not too old, nor suffering from severe organic disease), however urgent may be his symptoms, if they have not been of too long duration has, if injected with saline alcoholic fluid, a very good prospect of recovery. Often it is also his only chance. This belief is shared in by those who have seen my cases. The patients, however, require careful watching, and if the pulse is going, immediate reinjection again and again is necessary. When a patient has been long pulseless, clots form in the heart, and as I have seen, in two cases where injection was attempted, extend into the larger veins. In one case the fluid would not flow in, and only distended the veins of the arm injected. After death clots were found extending from the heart into the axillary vein. I have no doubt that in some of my earlier cases clots existed in the heart at the time of the injection. During the last three weeks many cases, not nearly so severe as those injected, have died; they have generally got over the collapse, but succumbed to the reactionary fever. Had those been injected, in

all probability, the event would have been different. The bad results, with this treatment, are due to the fact, that it is often only employed when the patients are in *articulo mortis*, under the impression that the injection is dangerous. This it is certainly not.

My best thanks are due to Dr. Fraser, for his kindness in permitting me to inject his patients, and to Dr. Jackson, our resident medical officer, for his assistance throughout; his attention to the cases, and, in two cases, reinjecting in my absence.

Since writing the above, more cases have been injected with satisfactory results.

REPORT ON THE CASES TREATED IN THE WAPPING DISTRICT CHOLERA HOSPITAL.

BY DR. W. B. WOODMAN, AND MR. N. HECKFORD.

On the 28th July, 1866, the Board of Works for the district comprising the parishes of Limehouse, Stepney, Shadwell, (with Ratcliff), and Wapping, acting on the advice of their Medical Officer, Mr. Orton, resolved to use the Old Wapping Workhouse, in Green Bank, Old Gravel Lane, as a Cholera Hospital, and two cases were received the same day. The main building is three stories in height, close to St. John's Church, and within a stone's throw of the Thames Tunnel, and almost equally close to the Wapping (tidal) Basin. Five wards have been opened, one for men, two for women and children, and two convalescent wards (on the upper story), one for each sex. All the wards are well lighted on both sides, and have one or more fireplaces, besides gratings over the doorways, and are at least twelve feet in height; (the convalescent wards are more than that). They all communicate with a central space, eighteen by ten feet, which contains the principal staircase, and extends upwards the whole height of the building, about fifty feet. Each patient, on an average, had at least 1200 cubic feet of air at the time the sick-wards were most crowded. The excreta have all been disinfected by Burnett's fluid. Soiled sheets, &c., before boiling, were all treated with chloride of lime. The stuffing of beds has been burnt, and the floor of each ward were well sprinkled with a solution of carbolic acid from four to six times daily.

The medical staff consisted of ourselves, and Mr. Frederick Elsom as apothecary, the building being used as a dispensary as well a hospital. The nursing has been conducted by Sisters of Charity and two other ladies, who superintended the hired nurses. The proportion of nurses to patients was about one to four and a-half, both by day and night. The daily number of cholera cases, and the ages and sexes of each, will be seen from the two Tables appended, as also the results.

TABLE I.

TABLE OF ADMISSIONS AND DEATHS.

Date.	Admitted.	Died.
July 28th	1	0
29th	2	0
30th	3	0
31st	6	1
August 1st	13	3
2nd	9	2
3rd	6	0
4th	8	6
5th	9	5
6th	5	4
7th	3	1
8th	12	7
9th	1	1
10th	5	1
11th	0	0
12th	5	3
13th	0	2
14th	2	1
15th	3	0
16th	4	0
17th	2	1
18th	0	0
19th	3	0
20th	2	0
21st	1	2
22nd	1	0
23rd	3	0
24th	0	1
25th	0	0
26th	1	2
27th	1	1
28th	0	0
29th	2	0
30th	1	1
31st	0	0
September 1st	1	0
2nd	0	0
3rd	2	0

TABLE II.

LIMEHOUSE DISTRICT CHOLERA HOSPITAL, WAPPING.

NUMBER OF PATIENTS AND MORTALITY AT VARIOUS AGES.

Ages.	Under 1 year.		1 to 5 years.		5 to 10 years.		10 to 15 years.		15 to 20 years.		20 to 30 years.		30 to 40 years.		40 to 50 years.		50 to 60 years.		60 to 70 years.	
Result.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.	Attacked.	Died.
Males	1	0	4	2	9	0	2	0	6	2	7	3	11	3	7	3	2	1	2	1
Females	0	0	7	4	9	4	5	1	5	1	11	4	14	6	9	6	5	3	1	1
Total	1	0	11	6	18	4	7	1	11	3	18	7	25	9	16	9	7	4	3	2

Males attacked 51, of whom 15 died,
Females attacked 66, of whom 30 died.
Both sexes attacked 117, of whom 45 died.

The total number of *cases* admitted up to the third of September, has been 165, including diarrhœa, severe colic, one case of typhoid fever, and one or two of fright. Of these forty-eight died, or 29·09 per cent. Only 117 were true cases of cholera, (no case has been called so unless a majority of the most characteristic symptoms were present), and of this number forty-five died, which gives a mortality of 38·46 per cent. The next Table will show the duration of forty-one of the fatal cases, in four others the time was not exactly known.

TABLE III.

DURATION OF 41 CASES FROM FIRST SEIZURE TO DEATH.

Time.	Under 12 hours.	12 to 24 hours.	24 to 48 hours.	48 to 72 hours.	72 to 96 hours.	96 to 120 hours.	120 to 144 hours.	144 to 168 hours.	13 days.	15 days.
Cases	3	11	11	3	3	4	1	2	2	1

N.B.—In 4 other cases the time of first attack was not noted.

It is noted that thirty-three out of the forty-five, or 73·3 per cent. died in the first or collapsed stage. The period from attack to convalescence (by which we do not mean entire recovery of muscular strength, but that state in which the pulse, respirations, and temperature reach a normal standard, and the digestive functions are carried on regularly and efficiently) was from four to five days in seven cases, from seven to eight days in forty cases, and from eight to fifteen days in twenty-four cases, in one not noted.

With regard to the class of patients, nearly all were badly fed and worse housed. Six were marked as cases of starvation, and eight marked as notoriously intemperate, and many more were really so. No adult total abstainer was admitted, and it will be noticed that the mortality is greatest at those ages at which the habit of intoxication is become fully formed. Four only of the cases are marked as having had constitutional syphilis, and of these two died. The majority of the men were dock-labourers; a few were sailors or stokers on board steamers, but not a single artisan was admitted for cholera. The influence of sex might appear from the Tables to be more important than perhaps it really is; an explanation of the excessive mortality in females, being offered by the fact that the men, whose occupations are more laborious, take care to be better fed, or at least fed on a more nutritious diet than the wives and children at home; the man getting his chop where he works, while the wife and children sip their weak tea and eat bread or potatoes, with a little dripping or salt-butter, at home. Three of the women, suffering from cholera were pregnant, all at three and a-half to four months, all aborted, *with scarcely any hæmorrhage,* and all died. Three had been lately confined, and of these two died. Eight others were

suckling when attacked; of these three died and five recovered. Some
milk continued to be secreted for a day or two, even during collapse, but
there was never any distention, and it was speedily absorbed. It may be
as well to state that three nurses were pregnant, but escaped unscathed.

In order to furnish data for comparison with other epidemics, or the same
elsewhere, it may be well to enumerate the leading symptoms, which are
taken from the ward books, in which each patient's name was entered on
admission.   They are as follows:—Either with or without preliminary
diarrhœa (which was noted in 36 per cent. of the cases, and probably
occurred in more), the patients were generally seized with vomiting and
sometimes nausea; indeed no case was observed without the former; griping
pains in the pit of the stomach and bowels, and cramps in the limbs, (the
legs chiefly,) which sometimes occurred even in sleep. In children the
cramps, or at least severe ones, were generally absent, but two children who
died had clonic convulsions, without any other known cause, but the
disease.

In a few cases there were distinct rigors, and in many slight shiverings.
The stools became more loose, and more frequent, and of the rice-water
character—a few, however, were seen of the consistence of jelly, and tinged
with blood.   The patients became utterly powerless, and in an hour or so
showed the well-known pinched features, and sunken eyes, with half-closed
lids, so characteristic of the abdominal collapse.   The pupils were generally
small; in only four cases marked as widely dilated, but acted on exposure
to strong light.   The conjunctivæ were highly injected, perhaps from the
vomiting.   Thirty-six per cent. were quite "blue" on admission, the blue-
ness being of an indigo tint; the others had only lividity of the lips, and
tips of the fingers and toes, with a pale, or dusky countenance.   The skin
was almost always wrinkled or flabby, and had lost its elasticity; but
this was less marked in children, as might be expected.

Fourteen per cent. were absolutely pulseless on first admission, the rest
had a pulse so feeble as to be counted with difficulty, or only felt as an
occasional flicker.   Where it could be counted, the range was generally
between 100 and 120.   The highest number was 130, and the lowest 60 per
minute.   In three cases, the pulse became slower than usual, during con-
valescence, and recovered itself on the patient's recovery.   The respiration
was always embarrassed, feeble, and shallow, and always quickened (20 to
30 per minute—the average being about 24).   The breath and tongue always
cold; the temperature in the axilla was found in this stage to be, on an
average, about 95°·5 Fahr.   But some cases, both of death and recovery,
were only 93°; and in four cases of extreme collapse, the temperature
equalled 98°, but this was probably analogous to the rise of temperature
noted in some cases after death; as in one of those which recovered, it
fell as low as 96°, when he rallied a little.   The temperature of the rectum,
was from $1\frac{1}{2}$ to 3° higher than that in the axilla; and in reaction, either
remained stationary, or fell a little, while the axillary temperature increased.

The reporters, however, consider that an exaggerated estimate of the importance of this fact must be guarded against—as the sheltered situation of the rectum (and vagina) must have its weight—and the increased heat might have been prognosticated from the congestion of the abdominal viscera, often observed in fatal cases. The secretion of urine was arrested completely. Extreme as was the collapse, the patients were generally sensible, and begged earnestly for water, in a hoarse whisper. This craving for water, in preference to any other drink, deserves to be considered instinctive, for the cry was common to the youngest child, and the eldest adult—those begging for water, who in health would have scorned so limpid a fluid. In the section, on treatment, it will be seen that we did not despise the hints of nature. After a few hours, or even two or three days, in some cases (generally after a long sleep, in which the patient's eyes were never more than half shut), reaction set in, warmth returned to the surface, and the temperature in the axilla usually rose to 97° at least, more often to 98° or 99° (Fahr.) at once, and in two or three cases to 100° (103° in one case). A warm perspiration set in, but the thirst continued; the tongue became warm, but was often dry and cracked. The secretion of urine returned, two cases (one M.; one F.), had retention; the cheeks became flushed, and the features less pinched; pulse and respirations still continued rapid and feeble; the conjunctivæ still injected. In 8½ per cent. all children, or young adults, sloughing of the corneæ set in, in a boat-shaped form, keel downwards, at the lower margin of the corneæ. One case, taken out before well, by her friends, got perforation of the cornea, and prolapse of the iris— with subsequent adhesion, forming an elliptical pupil. Twelve per cent. of the females had an acrid, sanious discharge from the vagina, not at the catamenial period, which excoriated the thighs, buttocks, &c. The first urine passed was of high specific gravity, and *albuminous in every case examined*—rich in colouring-matter, as shown by mineral acids, and also rich in uric acid. The microscope showed it to be full of epithelium from the whole genito-urinary tract, and also to contain casts of the uriniferous tubes—as in acute desquamative nephritis. More or less drowsiness generally accompanied the albuminuria, and often delirium of the uræmic (monotonous) kind. Nearly all the (twelve) deaths, in the second stage, appeared to be due to kidney-complication, the patients becoming comatose, delirious, and getting pneumonia, with a return of vomiting, and sometimes hiccup, and passing but little urine.

In three cases (of recovery) a roseolar rash, resembling the red form of urticaria, being patchy, and somewhat raised, was observed to occur, chiefly on the extremities, but in less degree on the face and trunk. One (M. aged 1½) had it on the seventh day. He took only one large dose of quinine on first admission. Another (F. 40) on the twelfth day, had been treated with camphor only in collapse. The third (F. 29) had it also on the twelfth day, and took no medicine, except chloroform. In all these, and in others without rash, desquamation of the cuticle occurred.

Several of the patients had sore-throat, and the glands in the neck, axillæ, groins, &c., were swollen and tender. In three cases buboes formed, and required incision; all in males—one was parotid; one axillary, and one superficial over the parotid—all recovered. The reporters agree in noticing a marked tendency to periodicity in the symptoms, as denoted by rise and fall in the pulse, respirations, and temperature, at intervals of one, two, three, or more days. The temperature, during convalescence, sometimes sinking nearly as low as in collapse without that occurring. No instance of second attack has occurred to our knowledge, although one or two relapsed before recovery.

Cases of the coexistence of scarlatina, variola, and varicella respectively, with cholera, were reported by us in the *Lancet*, of September 8th last, and we cannot refrain from calling attention to the number of cases of continued fever, which have occurred in this neighbourhood since the cholera has somewhat abated, as something more than a mere coincidence.

Although our experience of the epidemic has been comparatively limited, we are led to state briefly the general conclusions we have formed. The accompanying Tables will, in a measure, support our ideas on the subject.

Its nature.—In the first place we consider the cholera to be essentially *a fever*, having peculiar and distinctive characteristics, yet by its symptoms evincing its relationship, on the whole, to this class of diseases.

We confess it does not possess any exact resemblance to any one variety of fever, in fact, the contrary; but, on the other hand, each and every symptom of cholera (with slight modifications), will be found to be present in febrile diseases taken in conjunction, viz., collapse, wrinkled skin, rigors, vomiting, purging, thirst, suppression of urine, congestion of internal organs, ulcerations of the cornea, increase of temperature above the normal standard in reaction; secondary lesions, such as pneumonia, inflammation of the glands, albuminuria, with uræmic symptoms, eruptions and desquamations of the skin.

The cramps and copious watery evacuations are almost peculiar to cholera. Yet, these may be absent; and are, moreover, only analogous to the muscular pains and excessive sweating of ague, for example.

As to the mode of propagation, we have no data of importance.

From personal observation, the result of house-to-house visitation, we are enabled to state that the water used for drinking and ordinary purposes by the poor of the neighbourhood (and probably of the East-end generally) was extremely impure. This was due mainly to the filthy and exposed condition of the receptacles, and partly to a faulty supply.

The comparative immunity of the better classes leads one to suspect that the spread of the disease, principally through the medium of the atmosphere, is somewhat problematical. Allowing for better hygienic surroundings, it is certainly strange, and hardly credible that a poisonous agent, common to both, should destroy thousands of the poor, whilst their neighbours, in better circumstances, escaped scatheless.

Water and air are both vehicles for the distribution of cholera germs; but of the two, we think the former has played the principal part in the present epidemic.

In exemplification of this, the following facts are worthy of record:—

Of the inmates of a house, in the vicinity, three died of cholera, and twelve others had either cholera or severe diarrhœa. A family, in the uppermost story, were in the habit of emptying their excreta into a rain-water-pipe, which, becoming blocked up, allowed the filth to leak through a crack, and drop into the general water-butt.

Although a notable number of the staff of attendants had diarrhœa, yet in all it was quite trivial, and no one suffered from anything at all approaching cholera.

Respecting the infectious properties of the cholera evacuations, we may mention, that we attempted to communicate the disease to four dogs by mixing with their food either the "rice-water" matter of the intestines, the vomit, or blood of cholera patients. This was repeated on several occasions, and invariably caused vomiting and purging. The stools were always bilious, but the vomit was usually a clear frothy fluid. These attacks were of short duration, and did not seem to seriously affect the animals.

In common with other diseases, the predisposing causes were—poverty, starvation, drunkenness, over-crowding, want of ventilation, and an absence of all cleanliness, personal, or domestic. The apathetic indifference of the poor as to their own welfare, especially with respect to the last point, was most astonishing. It would scarcely be credited that we have known even excrementitious matter from cholera patients allowed to remain on the floors, the excuse being that danger was connected with its removal.

The large amount of hospital accommodation afforded has been the chief agent in checking the spread of the epidemic, by thus removing such centres of infection, and it is greatly to be regretted that the removals are not made compulsory.

Previous diarrhœa existed to our knowledge in 36 per cent. of the cases. This is most noteworthy, as it is of the highest importance, as regards treatment, to determine whether any real connection exists between cholera, and this supposed premonitory symptom. Such a large percentage, we think, removes all doubt on the point.

The interpretation we attach to it is, that it is produced by cholera-poisoning, in small doses. If in such cases this warning remain unheeded, and the patient continue under the same deleterious influences, an accumulation of the poison takes place, and its effects are manifested by the speedy collapse; this condition being aggravated, by the exhaustion induced by the past purgation.

This is further evidenced by the fact, that in almost every house within our observation where cholera occurred, one or more cases of diarrhœa required treatment.

TABLE IV.

NUMERICAL RETURN OF MODES OF TREATMENT.

Method of Treatment.	Cases.	Deaths.	Percentage of Recoveries.	Remarks.
Chloroform, opium, peppermint, and sulphuric acid	46	13	71·73	Equivalent to sulphuric-acid and chlorodyne (mixed cases).
Castor-oil	6	3	50·00	All appeared mild cases at commencement.
Stimulants only (brandy)	5	5	0·00	All severe cases (collapse).
Dietetic (with a little chalk-mixture for diarrhœa) -	7	·2	71·42	All mild cases at commencement.
Bark and ammonia -	3	1	66·66	All mild cases at commencement.
Camphor (Rubini's)	22	10	54·54	All severe cases (collapse).
Dr. Billing's treatment (antim. tart. mag. sulph. and afterwards quinine)	15	7	53·33	All severe cases (collapse).
Quinine and bark	11	2	81·81	All severe cases (collapse).
Saline injection into veins	3	2	33·33	Extreme collapse (all pulseless).

N.B.—All had the same general treatment of rest, hot bottles, free use of water, and other diluents, with milk, beef-tea, and eggs without stint.

With respect to the treatment, we may say that the various methods were tried fairly, and without any preconceived idea or prejudice.

On admission, the patients were thoroughly washed, except those in extremest collapse, and wrapped in blankets. At first sinapisms and hot bottles were particularly insisted on, but latterly such great stress was not placed on their use. The former often distressed them, and the latter were rendered comparatively useless by the great restlessness usually present. Neither old nor young could be prevented from throwing off the bed-clothes so as to expose the chest and arms. This was owing, we presume, to the attendant dyspnœa which rendered the least semblance of restraint unbearable. Water (iced or otherwise) was given to all without limit, and also milk and beef-tea, and solid food as soon as vomiting ceased.

The use of alcoholic stimulants was quite discarded in the stage of collapse; five having been treated with brandy alone, without a single recovery.

In the reaction stage, alcohol was given to those evidently sinking from want of power, but even in them little benefit resulted as a rule.

The following is the formula for the chloroform and acid mixture : chloroform one minim; dilute sulphuric acid ten minims; laudanum five minims; oil of peppermint one minim, and water half-an-ounce, to be taken every hour. This combination seemed to be most efficacious in many cases, in relieving the vomiting, purging, and cramps. The mixed nature of the cases, however (some of them being comparatively mild), tends to vitiate somewhat the percentage of recoveries. In one most severe case of cramp, chloroform inhalation acted as a charm. The patient was kept under its influence for about six hours, and at the expiration of that time, without

further treatment, a speedy and uninterrupted recovery took place. Supposing Dr. Johnson's theory to be correct, may not the inhalation of choloroform relieve the spasm of the pulmonary capillaries?

" Rubini's camphor treatment " was adopted in twenty-two cases. Its pretensions as a specific soon proved to be groundless. It invariably acted as an emetic, and its chief good appeared to be in causing determination to the skin, as evinced by an increase of temperature and a general flush. The patients expressed almost always a dislike to the camphor, chiefly on account of its being deposited thickly on the tongue, teeth, &c.

From ten to sixty drops of the solution were given at intervals, varying from ten minutes to an hour.

We think severe vomiting to be far from an unfavourable symptom. In most of the worst cases that recovered it was prominently present. At any rate it is a proof of the vital energies not being hopelessly depressed.

" Dr. Billing's treatment " meant the administration of small doses of tartar emetic, and salines, during collapse, at short intervals. (Tartar emetic one eighth of a grain, sulphate of magnesia thirty grains, water an ounce, every half-hour.) As soon as reaction set in, the above quantities were decreased by half, and quinine, two grains, substituted; the doses now being repeated every hour. When warmth of surface and perspiration had become well established, quinine alone was given.

Notwithstanding the recorded results, we have an impression in favour of this plan. In every instance in which it was adopted, the symptoms were most urgent.

Remembering the miasmatic nature of cholera, the use of quinine is strongly indicated, and its success so far, in our hands, warrants a further trial of it. Four grains, every hour, was the usual way of giving it, but sometimes a single large dose was tried. The question also arises, whether the good effects of the Billing treatment were not due to the quinine element in it; especially as the fatal cases generally died before reaction commenced, and consequently before they had taken any quinine? Its subcutaneous injection was the last resource adopted in one of the " Billing " cases, but without any benefit; the patient, however, was almost moribund at the time.

At the recommendation of a well-known physician, beef-tea was injected into the cellular tissue of the arm; in one instance about half-a-pint was introduced, and by the next day sloughing of the integument had taken place to the size of a crown-piece. A line of demarcation formed, and the arm progressed favourably, but the patient eventually died of uræmic symptoms.

It is to be regretted that saline injection into the veins was not resorted to more frequently. We have only three cases to record, and of those one recovered. All were pulseless at the time of the operation, and one was perfectly insensible. The one who recovered had no secondary fever. The instantaneous and marked benefit afforded to all recommends this mode of

treatment to a more extended trial. It is apparently the most rational, and we suspect its non-success is often due to its being delayed to the last moment.

Calomel was valuable in checking the vomiting of bilious matter during reaction.

The results of our *post-mortem* examinations are, to a great extent, contradictory. In opposition to the generally received opinion, the lungs of those dying in collapse were often congested, while in one case of death, during reaction, they were shrunken and bloodless.

. The heart contained blood in both sides (chiefly the right), but in one instance the ventricles were contracted and empty.

The gall-bladder being invariably full, we learn the practical fact that the supposed inaction of the liver is a myth, and that calomel to remedy this, is to say the least, unnecessary.

The mucous follicles in the intestines were generally remarkably prominent. .

Chronic renal disease had considerable influence on the mortality, especially in those who died in reaction.

RECORD OF POST-MORTEM EXAMINATION OF CASES DYING IN THE STAGE OF COLLAPSE.

Sex and Age.	Brain, &c.	Lungs.	Heart.	Liver and Gall bladder.	Spleen.	Kidneys.	Intestines.	Bladder.	Uterus.	Remarks.
F 23		Collapsed and anæmic.	Right almost empty, left ditto and contracted.	Not congested. Bile in ducts. Gall bladder full.	Normal.	Normal.	Lined with viscid milky fluid. Patchy injection.	Empty.	Ecchymosed. Sanious discharge. Orifice admits two fingers.	Had been confined a month. Temperature higher than in life. Died within forty-eight hours from seizure.
M 19	Veins of scalp and meninges turgid, ventricles full of serum. Puncta cruenta numerous.	Both bases red softening.	Right side full.	Gorged.	Very small.	Congested, especially the pyramids.	Full of thin green fæculent fluid.	Full.		Had been taking iron. Died thirty hours after admission.
F 32	Congested, ventricles full of serum.	Both bases red softening.	Empty and contracted.	Large and waxy. Gall bladder full.	Normal.	Waxy degeneration (incipient).	Contained thin greenish fæculent matter. Patchy injection.	Empty.	Ecchymosed. Sanious discharge.	Not menstruating. Died forty hours after admission.
F 5		Congested.	Both sides full.	Congested. Gall bladder full.	Slightly congested.	Normal.	Contained a little "rice-water" fluid. Mucous membrane had a "boiled tripe" appearance.	Empty.		Died half an hour after admission.

Age and Sex	Brain, &c.	Lungs	Heart	Liver and Gall Bladder	Spleen	Kidneys	Intestines	Bladder	Uterus	Remarks
M 38		Congested.	Both sides full.	Normal. Gall bladder full.	Normal.	Normal.	Highly injected in spots. Full of milky fluid. Mucous membrane peels readily.	Empty.		Died thirty hours after seizure.
F 7		Gorged.	Both sides full.	Gorged. Bile in ducts.	Normal.	Congested, especially pyramids.	Peritoneal coat finely injected. Contained fæcal matter of a yellow tinge.	Full.	Undeveloped (size of a pea).	Died within twelve hours after admission.
F 4½		Upper lobes anæmic, lower a little congested.	Right side full.	Normal. Gall bladder full.	Congested.	Normal.	Bile coloured fluid in duodenum. "Rice-water" in small intestines. Large ditto empty.	Empty.		Died four hours and a-half after admission.
M 43		Congested throughout. Bases softening (barely floated).	Full both sides.	Normal. Gall bladder flaccid.	Rotten and diffluent.	Granular.	Upper part contained greenish-yellow fluid. Lower part "rice-water." Colon empty.	Empty.		Admitted for bilious diarrhœa, went on to cholera, and died in two days from seizure.
F 4¾		Upper part anæmic, bases of congested.	Both sides full of dark clots and blood.	Normal. Gall bladder full.	Normal.	Normal.	Small intestines contained yellow gruel-like fluid. Were finely injected.	Empty.		Died on second day after admission.
F 65		Emphysematous, congested and full of frothy serum.	Pale clot in right side.	Rather fatty.	Normal.	Very granular.	Peritoneal and mucous coats injected. Contained thin brownish fæcal matter.	Empty.	Contained a fibroid, with softening and cavity in centre.	Died seventeen hours after seizure.

Sex and Age.	Brain, &c.	Lungs.	Heart.	Liver and Gall Bladder.	Spleen.	Kidneys.	Intestines.	Bladder.	Uterus.	Remarks.
F 35		Collapsed. and bloodless.	Full both sides.	Fatty.	Normal.	Incipient waxy. Pyramids injected.	Contained "rice-water."	Empty.	Fundus ecchymosed. Sanious discharge. Large corpus luteum.	Suckling three months. Died twenty-four hours from seizure.
M 5		Full of frothy serum.	Full both sides.	Apparently normal. Gall bladder full.	Normal.	Normal.	Peritoneal coat much ingested. Mucous membrane had a "boiled tripe" appearance, a little "rice-water" fluid present. A recent intus-susception near ileo-cæcal valve.	Empty		Died twelve hours after seizure.
M 46		Very emphysematous, on both sides gorged with blood, and full of frothy fluid.	Large dark clots on both sides adhering to aortic and pulmonary valves.	Pale and fatty. Gall bladder full.	Normal.	Slightly fatty. Pyramids injected.	Contained "rice-water." Small intestines had a boiled tripe appearance with patches of congestion.	Empty		A case of saline injection into veins; twelve pints. Specific gravity of blood 10·30. Corpuscles apparently uninjured. Died twenty-two hours after seizure.
F 6	Veins of dura mater anaemic, right much conges-ted. Much congested.	Left lung moderately congested	Right heart full, pale clot in auricle. Left ventricle contracted.	Gorged with blood. Gall bladder full.	Moderately congested.	Right congested, left normal.	Full of "rice-water," some of it gelatinous, containing casts of	Empty.	Normal.	Died nine hours from seizure, but had premonitory diarrhoea

POST-MORTEM EXAMINATION OF CASES DYING IN THE STAGE OF RE-ACTION.

Sex and Age.	Brain, &c.	Lungs.	Heart.	Liver and Gall Bladder.	Spleen.	Kidneys.	Intestines.	Bladder.	Uterus.	Remarks.
	serum in sub-arachnoid space. Brain and pale soppy.						bile, epithelium, etc. Commencing intus-susception in small intestine.			A case of saline injection into veins. Blood corpuscles un-injured.
F 21		Both red, softening.	Full both sides.	Congested. Gall bladder full.	Small.	Congested, especially pyramids.	Contained bile-coloured fluid. Mucous membrane finely injected.	Empty.	Corpus luteum in right ovary.	Had aborted prior to admission. Died between four and five days after seizure.
M 42		Bases hepatized.	Walls thin and pale. Atheroma of arteries.	Waxy degeneration. Gall bladder full.	Large, congested.	Large and waxy, pyramids almost obliterated.	Contained yellow fæcal matter.	Empty.		Had a large arcus in both eyes. A great drunkard. Died delirious. Died between four and five days after seizure.
F 28		Anæmic except at right base.	Fibrinous clots on both sides, very firmly adherent.	Congested. Gall bladder full.	Healthy.	Waxy.	Contained thin black fluid.*	Empty.	Corpus luteum in right ovary. Uterus congested — menstrual.	* Had been taking iron. Died between six & seven days after seizure.
M 40		Very emphysematous congested, & bases softened.	Large, pale, flabby, and soft. Contained a large dark clot in right side.	Pale and soft. Gall bladder empty.	Healthy.	Large (about ½ pound each) soft, pale and coarsely granular. Pyramids congested.	Contained brownish feculent matter.	Full of albuminous urine		Died thirteen days after seizure.

REVIEW OF FACTS AS REGARDS THE SPREAD OF THE PRESENT EPIDEMIC OF CHOLERA.

BY DR. LETHEBY.

THE history of the present epidemic of cholera, as far as it is yet known, is, in many respects, remarkable; the rise and progress of the disease, as well as its habits and duration having been very different from what was observed of it at either of its former visitations; for, excepting the third great European outbreak of the epidemic in 1853-54, which did not advance into Europe from the East, but was developed from foci already existing in several parts of the Continent; the preceding epidemics of 1831-32, and 1848-49, were characterized in each case by the same methods of invasion, and by almost identically the same lines of route, neither of which have been followed in the present occasion. For example, there was first a severe outbreak of the disease in India, where it lasted for a year or two before its migration in Europe. It then passed in a north-westerly direction through Persia to the foot of the Caucasus, where its progress was, for a time, arrested. Its course was also there diverted; for it passed westerly by the Black Sea and the Danube, into Southern Europe, and more northerly by the Caspian Sea, and the Volga, into the north of Russia; and thence by the Baltic through Russia and Holland, to the Eastern ports of England.

At the time of its invasion also, there was everywhere observed an unusual amount of sickness, especially of a zymotic character.

But the present epidemic has not been characterized by any of these peculiarities; for, in the first place, there has been no serious outbreak of cholera in India, since the terrible epidemic of 1861. Not that the disease is ever absent from the Indian Peninsula, for it yearly causes a large mortality of our troops, as well as of the native populations; and last year it was somewhat severe at Bombay and Poonah: but for all this, there has been no serious epidemic like that which preceded the former invasions of the disease.

And instead of coming to us through the North-Western provinces of India, and by Persia, to the shores of the Black Sea and the Caspian Sea, it has reached us from Arabia, and the South-Eastern coast of the Mediterranean. The time also of its journey has been remarkably short. In the epidemics of 1831-32, and 1848-49, years were occupied in their movements —the outbreak of the disease in India lasted for a year or more before it crossed the Peninsula; then there was the journeying of it through Persia and Georgia to the Caucasus, where it halted for a winter, and although it moved forward, in the following spring, along the Western shore of the Caspian Sea, to the Volga, and by the Southern shore of the Black Sea to the Don, and by both of these rivers into Russia, yet it went no farther than

Moscow during that year, for there it again rested for a winter.   Even, in
the following year, its progress northward was not rapid, for it did not reach
St. Petersburg until the months of June and July, and even not in England
until the third winter of its journey.

But the present epidemic has come to us within five months of its appear-
ance on the Eastern shores of the Mediterranean, and its invasion has not
been from the North, but through Southern Europe.

Early in the spring of 1865 two English vessels from Singapore, laden
with pilgrims, chiefly Javanese, on their voyage to Mecca, touched at a port
named Makalla, on the south coast of Arabia, where cholera was prevailing.
Here the crew and passengers became infected with the disease, for, a few
days afterwards, while the ships were on their voyage to Jedda, they suffered
severely from it, and the mortality was excessive. As soon, however, as the
ships entered the Red Sea, and encountered the strong north wind which
prevails there at that season of the year, the epidemic ceased, and by the
time they had reached Jedda, which is the port at which they landed for
Mecca, there was no evidence of the disease among them.   They, therefore,
journeyed onwards to Mecca, and on the second of May the Mussulman
festival of Kourban-Bairam, or the Festival of Sacrifices commenced. Under
ordinary circumstances it lasts for twenty days, and it brings together from
70,000 to 80,000 persons, but as this was a jubilee year, the number of
pilgrims was unusually large—amounting, perhaps, to about 100,000. They
had come from all parts of Asia and Africa, and consisted mostly of the
very lowest classes of Mahometans, who had undergone the greatest priva-
tions and fatigues during their pilgrimage; and in addition to this, the very
rites of the festival created a condition of things which soon begat disease.;
for, crowded as they were together, feeding on the poorest diet, drinking
water polluted with corruption, scattering about them the remains of their ⟨
animal sacrifices, and living in the utter violation of all the rules of hygenie,
it is not surprising that there should have been, as usual, a large amount of sick-
ness among them : and this year there also appeared the severest manifesta-
tion of cholera. In the official reports of the place it was merely mentioned as
cholerina; but the disease, must have been very severe, or it would not have
broken up the festival, for soon the panic-stricken pilgrims were found upon
their road homewards. On the 10th of May a large number of them returned
to Jedda, and on the 19th the first ship-load of them arrived at Suez,
whence they were hurried on by the railroad to Alexandria. Everywhere
along the line of route the cholera appeared. It showed itself at Jedda on
the 12th of May, at Suez on the 22nd, at Alexandria on the 2nd of June,
and thence it spread by the lines of commerce in all directions. On the 17th
of June it had moved inwards by the river to Cairo, and directly after it
was at Damietta, Rosetta, Tantah, and nearly all the towns and villages on
the Delta of the hill.   From Alexandria it was traced to Malta, Smyrna,
Constantinople, Jaffa, Behrout, Valencia, Ancona, and Marseilles, and each

of these places also became foci of infections. From Malta, where it appeared on the 20th of June, it was carried to the neighbouring island of Gozo and to Gibraltar. From Constantinople, where it showed itself on the 28th of June, it was taken to Odessa, and Salina, and from Ancona in Italy, where it was first seen on the 8th of July, it spread to other parts of the Adriatic, and passed inland to Bologna, Madeira, and other Italian cities. From Marseilles, where it is reported to have appeared on the 23rd of July, it was conveyed to Paris and Havre; and from Alexandria it came to Southampton about the middle of September. Before the first week of December it appeared at New York, where it was carried by infected passengers from Havre or Southampton. In all, therefore, hardly six months had expired from the outbreak of the disease at Mecca to its appearance on the Western hemisphere. The contrast of this with the slow progress of the malady in 1831-32 and 1848-49, is remarkable. In the epidemic of 1829-32 Astrachan was attacked on the 20th of July, 1830, Hamburg in September, 1830, Sunderland on the 26th of October the same year, and New York in June, 1832. The epidemic, therefore, occupied nearly fourteen months from the time of its entrance into Europe, in traversing the Continent; fifteen months in reaching Great Britain, and two years, less one month, in arriving on the North American coast. In the epidemic of 1845-48 the diseased reached Astrachan in June, 1847, Hamburg in September, 1848 (crossing the Continent of Europe in nearly the same period of time as in the former epidemic), England in the same month, (Horselydown, 22nd September, 1848), and New Orleans on the 2nd of December of the same year—nineteen months after the appearance of the epidemic on the eastern borders of Europe." *

This rapid progress of the disease does not appear to have been caused by any peculiar virulence of it, but by the quick movements of commerce.

Another peculiarity of the present epidemic has been its disinclination to spread inland, notwithstanding that its extension along the coast line has been so rapid, for, excepting the capitals of England and France, and a few isolated places on the Continent, the disease has not shown itself in a virulent form at any large distance from the sea-coast.

And lastly, the epidemic has not been preceded by any remarkable amount of zymotic disease. It is difficult to speak of the general condition of the public health at the time of the visitation of the disease in 1831-32, but, in the epidemics of 1848-49 and 1853-54, there were an unusual amount of zymotic disease. "At Moscow, and St. Petersburg, and in other Russian towns, the outbreak of 1848 was preceded by a general prevalence of influenza and of intermittent fever; the latter disease, in many continental cities, taking the place of typhus in this country. Diarrhœa also, in the European cities first attacked, was generally prevalent before the actual outburst of the disease. At Berlin, intermittent fever, diarrhœa, dysentery,

* Mr. Radcliffe in Eighth Report of Medical Officer of the Privy Council, p. 366.

but especially diarrhœa, were epidemic. The same disease, but particularly intermittent fever, scarlet-fever, and influenza, were prevalent at Hamburg . In London there had been, during the preceding five years, a progressive increase in the whole class of zymotic diseases, amounting to an excess above the average of 31 per cent., while the mortality from typhus, which in 1846 considerably preponderated over that of 1845, was still higher in 1847, and exceeded in 1848, by several hundred deaths, the mortality of any preceding year. The deaths from scarlet-fever were also greatly above the average, and such was the mortality from influenza, that in 1847 and 1848, almost as many at the earlier periods of life perished by this disease, or by the more terrible epidemic that followed it; but the malady, which all along continued its course with the most steady progress, was that which was most nearly allied in nature to the approaching epidemic—namely, diarrhœa; the deaths from this disease in the five years ending with 1848, amounting to 7,580; whereas in the preceding five years they were only 2,828; while, taking separate years in the series, the deaths in 1848 were more than seven times greater than in 1839, and nearly five times greater than in 1841.*

A like increase of certain zymotic maladies, as typhus, scarlatina, whooping-cough, and diarrhœa, preceded the epidemic of 1854, as if the condition of the public health was below the standard, or there was an increase of certain forms of the zymotic force. The deaths in England from scarlatina for example, rose from an aggregate of 13,634 in 1851, to 18,887 in 1852; typhus from 17,121, to rather more than 18,000 in 1853; whooping-cough from 7,905 to 11,200; and even diarrhœa did not discontinue its ravages after the epidemic of 1849, for the deaths in the three following years were 11,468, 14,728, and 17,617; thus showing a gradual increase in the mortality from diarrhœa to the very advent of the cholera year (1853). Not so, however, with the coming of the present epidemic, when the condition of the public health, in so far as it would be judged of by the mortality returns, was above the average. And then, again, the sudden appearance of the disease in the Eastern districts of the Metropolis, and its rapid increase in severity, are also remarkable. Up to the end of the first week in July there was no evidence of the disease in London; but on Sunday, the 8th of July, a man aged 29, the mate of a ship which had just arrived with fruit from Rotterdam, where cholera prevailed, died in Bermondsey, from Asiatic cholera, after an illness of eleven hours. The next day there was another case at Hoxton; and on the 11th of July there were three deaths from cholera in the Eastern districts of London; one of these occurred at the London Hospital, another at Limehouse, and the third at Poplar—all in the port of London. At the close of the week (July 14th) thirty-two deaths from cholera were recorded; and of these twenty were in the neighbourhood of the Hospital. From that time the disease rapidly increased, so that by the end of the first week in August, 2,335 deaths from cholera, and 1,074 from diarrhœa, were returned

* *Report of the General Board of Health on the Epidemic of Cholera of 1848-49,*
p. 9.

upon the registers of London; of these numbers, 2,062 of the cholera deaths, and 345 of the diarrhœa deaths occurred in the Eastern districts, immediately around the London Hospital. But after that the force of the epidemic gradually abated, although, week by week, its violence has been most felt in the districts which belong to the port of London, where the Hospital is situated.* It would be premature to enter at present on the probable cause of this apparent selection of districts; or, although the history of the previous epidemics tells us of the influence of certain conditions of water-supply on the force of the disease, yet it also informs us of the like influence of filth, and poverty, and overcrowding; as well as of defective drainage, and low-lying situations. If, therefore, it be a remarkable fact that the force of cholera has been exerted in the very districts supplied by a certain water-company, it is also a fact that those are likewise the districts best suited for the manifestation of the disease, on account of other imperfect sanitary conditions: and it is worthy of note that certain places not supplied with water by the company, but situated within the cholera-field, have been severely visited by the disease; while other places, using the suspected water, but not within the confines of the infected area, have not been touched by it. This is so with two of the workhouses of the City Unions. One of these workhouses is in the parish of Bromley, not far from the London Hospital; it does *not* use the water of the East London Company, and yet it has lost twenty-seven persons from cholera, out of a population of less than 800. On the other hand, the workhouse at Hackney, which *is* supplied by the East London Water Company, but is situated among the Northern districts of London, has not had a single death from the disease. It is manifest, therefore, that the laws of these epidemic visitations are not known

* *Deaths from Cholera and Diarrhœa in the several Districts of London, from July 7th to September 22nd, 1866.*

Week ending.	Deaths from Cholera.						Deaths from Diarrhœa.					
	Districts.					Total.	Districts.					Total.
	West.	North.	Central.	East.	South.		West.	North.	Central.	East.	South.	
July 14th	2	4	3	20	3	32	18	37	28	37	30	150
21st	11	6	1	308	20	346	37	54	31	60	39	221
28th	12	20	15	818	39	904	48	78	44	123	56	349
August 4th	12	46	33	916	47	1053	46	79	42	125	62	354
11th	8	38	23	673	39	781	31	51	31	101	50	264
18th	7	15	16	369	48	455	28	40	22	63	41	194
25th	3	12	13	198	39	265	15	21	13	41	39	129
Sept. 1st	6	15	9	122	46	198	12	24	18	43	31	128
8th	12	20	12	74	39	157	18	19	14	44	37	132
15th	10	27	20	77	48	182	14	11	15	35	35	110
22nd												
Total in 11 weeks	83	203	145	3575	368	4373	267	414	258	672	420	2031

to us. " Partly we have learnt the conditions which augment their local spoil; but nothing of what evokes their slumbering powers, nothing of what governs their world-wide spread, nothing of what determines their eventual decline, nothing of what permits their fitful mildness. . In this domain of unknown, perhaps unconjectured influences, science would count it irreverence and temerity to dogmatise on a single instance of apparent correlation, or to speak of the obscure impulses of that wandering plague, as though they were strokes of some machine, subject to the guidance of one's human will." *

Another circumstance, of singular importance in the history of the present epidemic, is the comparatively large mortality from the disease on the Tuesday of every week. Classifying the daily returns, which have been published by the Registrar-General since the 4th of August, the number of deaths, for every day in the week, stands thus :—

Daily Returns of Deaths from Cholera and Diarrhœa in London.

Weeks ending.	Deaths from Cholera.						Deaths from Diarrhœa.					
	Sunday and Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.	Sunday and Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
August 11th	240	130	109	114	85	94	66	43	39	47	38	31
18th	139	77	61	64	60	51	46	28	32	40	25	23
25th	70	51	35	38	35	36	29	27	14	17	19	22
September 1st	53	31	29	29	21	35	28	23	22	16	17	22
8th	30	31	25	28	19	24	34	21	20	14	20	23
15th	38	26	32	28	32	26	32	16	20	14	9	19
22nd												
Total. . • .	570	346	291	301	252	266	235	158	147	148	128	140

So that for every 100 deaths from cholera that have occurred on the daily average of Sunday and Monday, 122 have occurred on Tuesday, 102 on Wednesday, 105 on Thursday, 88 on Friday, and 93 on Saturday ; and so also of diarrhœa, the proportional numbers being 100, 134, 125, 126, 109, and 111 : as if the dissipation of Saturday rendered individuals more sus. ceptible of the disease, which attacked them on Sunday or Monday, and killed them on Tuesday, after which the force of the malady again declined until the following Tuesday.

As to the mortality from the disease, in proportion to the number attacked, it would seem, from the records of the London Hospital, that the violence of the epidemic, in this respect, has been much the same as in former visitations. The proportion of deaths to attacks, so far as the numbers have been collected to the present time, are as follows :—Brahilow, 47·0 per cent.; Odessa, 50·4 ; Paris (Hospitals), 51·6 ; Gibraltar, 54·0 ;

* Report on the Cholera Epidemic of 1854, as it prevailed in the City of London, by J. Simon, F.R.S., etc., p. 14.

Ancona (city and environs), 57·1, and Malta, 60·3 ;* while that of the London Hospital has been 54·1 per cent. In the epidemic of 1853-4, the range of mortality in England was from 41 to 51 per cent., the average being 45·2 ; and in the severe epidemic, in Northern India in 1861, the mortality among the European troops was 63·8 per cent. of all who were attacked. It is difficult, however, to obtain precise information of the actual force of this disease among all classes of the community in London ; for it is more than probable that the cases which are brought to the Hospital, not only represent the severest forms of the disease, but also the poorest classes of people. Lastly, it would seem, that the duration of the fatal cases has been nearly the same as in former visitations, about half of them having terminated fatally within the first twenty-four hours of the appearance of decisive symptoms—whereas, half of the cases of common cholera terminate in about three days, and half of those of diarrhœa extend over a week.

The further particulars of the present epidemic, and the points of difference and resemblance to those of former visitations of cholera, have yet to be determined ; and the records of this experience of the disease in the wards of the London Hospital will form no small or unimportant part of both the medical and social history of the epidemic.

* Mr. Ratcliff on the Present Diffusion of Cholera in Europe, in Eighth Report of Medical Officer of the Privy Council, p. 369.

INDEX.

THE

London Hospital & Medical College,

MILE END.

1865-67.

The next WINTER SESSION will commence on Monday, October 1st, 1866, when The Introductory Lecture will be delivered by Dr. HEAD, at 3, P.M. Lectures on Anatomy, Physiology, and General and Morbid Anatomy, Chemistry, Medicine and Surgery, will be given.

The next SUMMER SESSION will commence on the 1st of May, 1867. Lectures on Midwifery, Materia Medica, Ophthalmic Surgery, Botany, Forensic Medicine, Comparative Anatomy, Practical Chemistry, and Practical Histology, will be given.

WINTER SESSION, 1866-67.

Medicine—By HERBERT DAVIES, M.D., F.R.C.P., Physician to the Hospital, ANDREW CLARK, M.D., F.R.C.P., Physician to the Hospital, and J. S. RAMSKILL, M.D., Lond., Assistant-Physician to the Hospital.

WEDNESDAY and THURSDAY at 9, A.M., and on FRIDAY at 4, P.M.

Surgery—By JONATHAN HUTCHINSON, Surgeon to the Hospital, Assistant-Surgeon to the Royal London Ophthalmic Hospital, and Surgeon to the Hospital for Skin Diseases.

TUESDAY, FRIDAY, and SATURDAY, at 9, A.M.

In connexion with these Lectures, three short special Courses will be given, during the Summer months, on Ophthalmic Diseases, on Syphilis, and on Diseases of the Skin.

Descriptive and Surgical Anatomy—By JOHN ADAMS, Surgeon to the Hospital; and WALTER RIVINGTON, M.S., Lond., Assistant-Surgeon to the Hospital.

MONDAY, TUESDAY, THURSDAY, and FRIDAY, at 3, P.M.

The Class will be examined at the termination of each Session.

Physiology and General and Morbid Anatomy—By J. HUGHLINGS JACKSON, M.D., Assistant-Physician to the Hospital, and to the Hospital for Epilepsy and Paralysis; and MORELL MACKENZIE, M.D., Lond., Assistant-Physician to the Hospital, and Physician to the Hospital for Diseases of the Throat.

MONDAY, WEDNESDAY, and THURSDAY, at 4, P.M.

Supplementary Demonstrations during the Summer.

Practical Anatomy—By WALTER RIVINGTON, M.S., Lond., Assistant-Surgeon to the Hospital, JAMES ADAMS, and WAREN TAY.

Attendance in the Dissecting Room daily from 10 to 3, excepting Wednesday and Saturday Afternoons.

A Demonstration or Examination either in the Anatomical THEATRE or DISSECTING ROOM, on MONDAY, TUESDAY, THURSDAY, and FRIDAY, at 12.30, P.M.

Chemistry—By HENRY LETHEBY, M.B., Lond.,

MONDAY, WEDNESDAY, and FRIDAY, at 10.30, A.M.

The subjects of this Course are Physics in their relation to Chemistry and Chemistry proper. These are alternately made the chief subjects of the course, so that Pupils who are studying for the Universities may, in the period of two Winter Sessions, obtain a full course of Lectures on each subject.

2

Anatomy and Pathology of the Teeth, and Dental Surgery—By H. J. BARRETT, M.R.C.S.E.

This Course consists of Twelve Lectures, and will be delivered at 5, P.M.

A Fee of £2 2s. will be required from gentlemen desiring a Certificate of Attendance on this Course.

SUMMER SESSION, 1867.

Midwifery and Diseases of Women and Children—By F. H. RAMSBOTHAM, M.D., Fellow of the Royal College of Physicians.

DAILY (EXCEPT SATURDAY), at 3 P.M.

Gentlemen when qualified have opportunities of attending an unlimited number of cases of labour in the neighbourhood of the Hospital.

Forensic Medicine—By F. H. RAMSBOTHAM, M.D., and J. E. D. RODGERS, M.R.C.S.E., L.S.A.

DAILY (EXCEPT SATURDAY), at 10.15, A.M.

Materia Medica and General Therapeutics—By J. LANGDON H. DOWN, M.D., Assistant-Physician to the Hospital.

TUESDAY, THURSDAY, and FRIDAY, at 4, P.M.

A Cabinet of Materia Medica is open to Students.

Ophthalmic Diseases—By JONATHAN HUTCHINSON, Surgeon to the Hospital, and Assistant-Surgeon to the Royal London Ophthalmic Hospital.

TUESDAY, WEDNESDAY, and FRIDAY, at 9, A.M., during the month of June.

This Course will comprise all Diseases of the Eye and its appendages, with their medicinal and operative treatment. Special instruction will be given in the performance of Operations; the use of the Ophthalmoscope; the employment of Spectacles, &c.

Practical Chemistry—By HENRY LETHEBY, M.B., LOND.

In this Course the operations are conducted by the Students, under the Superintendence of Dr. Letheby, during MAY, JUNE, and JULY, on MONDAY, THURSDAY, and SATURDAY, at 9, A.M.

Botany—By CHRISTOPHER DRESSER, Ph. D., F.L.S., Professor of Botany in the Department of Science and Art, South Kensington Museum.

MONDAY, WEDNESDAY, and FRIDAY, at 10, A.M.

Practical Histology, and the Use of the Microscope in Diagnosis—By J. HUGHLINGS JACKSON, M.D., and MORELL MACKENZIE, M.D.

This Course embraces, 1st, the methods of investigating and preserving the tissues and organs of the body in health and disease; and, 2nd, the clinical examination of the blood, urine, sputum, fæces, and other excretions and discharges.

A Cabinet of Microscopic Preparations is open to the Students.

This Course is free to past and present Pupils.

Comparative Anatomy—By WALTER RIVINGTON, M.S., Assistant-Surgeon to the Hospital.

This Course will consist of from 18 to 20 Lectures, several of which will be devoted to the consideration of the Parasites afflicting Man and Animals.

TUESDAY and THURSDAY, 11.30, A.M.

One Course........ £3 3s.

Free to Students who have paid the General Fee.

Special Instruction in Operative Surgery, in accordance with the Army, Navy, and India Board Regulations, under the superintendence of C. F. MAUNDER, Assistant-Surgeon to the Hospital.

Instruction in Medical Classics, &c., &c.—Dr. BUCHHEIM

Will attend at the College, on WEDNESDAY, at 7, P.M., to superintend the Studies of Gentlemen preparing for the Preliminary Examination.

Fee for the Course.................... £2 2s.

HOSPITAL PRACTICE.—The London Hospital contains 445 beds, of which 135 are allotted to Medical, and 310 to Surgical cases. Of these 310 beds, about 190 are exclusively appropriated to cases of accident. In the year 1865 the Hospital received 32,640 patients, including 4,317 In-patients and 28,313 Out-patients.

Wards are specially appropriated to cases of Uterine Disease and to a limited number of cases of Syphilis.

Maternity Department.—About 500 poor women were delivered at their own residences during the past year.

MEDICAL AND SURGICAL STAFF OF THE LONDON HOSPITAL.

Consulting Surgeon—Mr. LUKE.

Physicians—Dr. FRASER, Dr. DAVIES, and Dr. A. CLARK.

Surgeons—Mr. ADAMS, Mr. CURLING, and Mr. HUTCHINSON.

Assistant-Physicians—Dr. RAMSKILL, Dr. DOWN, and HUGHLINGS JACKSON, and Dr. MORELL MACKENZIE.

Assistant-Surgeons—Mr. MAUNDER, Mr. COUPER, Mr. LITTLE, and Mr. RIVINGTON.

Obstetric Physician—Dr. HEAD.

Assistant Obstetric Physician—Dr. PALFREY.

Surgeon Dentist—Mr. BARRETT.

One of the Physicians and one of the Surgeons attend daily; the former at 8, A.M., or 1, P.M.: the latter at 1, P.M.: and one of the Assistant-Physicians and one of the Assistant-Surgeons daily at 1, P.M.

Casulties are admitted at all hours by the House Surgeons and Dressers.

Surgical Operations, except in cases of emergency, are performed on WEDNESDAY, at 2, P.M.

Dr. HEAD attends on WEDNESDAY and SATURDAY, at 1.30, P.M., to visit the Obstetric In-patients, and Dr. PALFREY on WEDNESDAY and SATURDAY, at 1 P.M., for the Out-patient department.

Mr. BARRETT gives practical instruction in Dental Operations on TUESDAY, at 10, A.M.

Clinical Lectures—Clinical Lectures are given by the Physicians and Surgeons, and by the Obstetric Physician.

Practical Classes on Auscultation and Percussion.

Practical Morbid Anatomy—The Post-mortem Examinations take place at 2.30, P.M., and are superintended by Dr. HUGHLINGS JACKSON, Dr. SUTTON and Mr. LITTLE.

Museum and Library—The Anatomical Museum is open daily to the Students from 11, A.M., to 2, P.M.

Curator—Mr. LITTLE.

The Reading Room is open daily from 10, A.M., to 4, P.M.

The gentlemen who have entered to the Medical or Surgical Practice, or two or more Courses of Lectures are admitted without any fee to the Reading Room. The subscription to the Library is £1 1s., and is perpetual.

Prizes and Appointments.—The following Prizes and Appointments are conferred as Rewards of Merit on qualified Pupils of the Hospital and School:—

1. Two Scholarships will be awarded during the next Winter Session. The competition will be restricted to first year's Students. The first, value £20, will be awarded to the Student who shall pass in December, 1866, the best examination in Human Osteology. The second, value £25, will be awarded to the Student who shall pass, at the end of the Winter Session, the best examination in Anatomy, Physiology and Chemistry.

2. The Duckworth-Nelson Prize, value £10 10s., is awarded by competition once in two years, and is open to all Students who have not completed their education. The subjects of examination in 1868 will be Practical Medicine and Surgery.

3. Two Gold Medals are annually awarded by the Governors to Students attending the Medical and Surgical Practice, who shall have most distinguished themselves in the performance of their duties at the Hospital.

4. A Resident Medical Officer, who resides and boards in the Hospital, and receives £75, is appointed for twelve months by the Committee of the Hospital. The Resident Medical Officer is eligible for re-election for the further period of twelve months, and then receives £100. In the absence of the Physicians and Assistant-Physicians, the Resident Medical Officer has the general superintendence of the Patients in the Medical Wards.

5. A Medical and Surgical Registrar is appointed by the Committee of the Hospital, and receives £25 a year.

6. Three House Surgeons are elected every six months, without any additional expense; they reside in the Hospital, and are provided in part with commons. The House Surgeons are eligible for re-election for the further period of three months. In the absence of the Surgeons and Assistant-Surgeons, the House Surgeons have the general superintendence of the Surgical department of the Hospital.

7. A Resident Accoucheur is appointed for six months, free of all expense, and is provided with residence and partial board. He is the Clinical Assistant to the Obstetric Physician, and the Assistant Obstetric Physician, and under their superintendence assists in the care of the In and Out Obstetric Patients, and in the conduct of the Maternity Department and the Vaccination Department.

8. An Assistant-Medical Officer is chosen from among the Medical Pupils. He remains in the Hospital day and night, and is provided in part with board.

9. Two Surgical Dressing Pupils, in rotation, remain in the Hospital day and night for a week, and are provided in part with board.

10. Additional Dresserships are, under certain conditions, given to Pupils of the School who have obtained certificates for Dressing the Out-patients.

11. An Assistant-Dentist is elected for three months, without any additional expense.

11. Post-mortem Clerks are selected from among the Students according to merit.

13. Special Certificates are given to those gentlemen who have faithfully performed their various duties.

14. In the selection of candidates, preference is given to those Pupils who are most distinguished by general good conduct, by ability, and by industry.

FEES FOR ATTENDANCE ON THE HOSPITAL PRACTICE.

ON THE MEDICAL PRACTICE,—For six months, six guineas; for period required by Apothecaries' Hall, twelve guineas; unlimited, twenty guineas.

ON THE SURGICAL PRACTICE AND DRESSING.—For six months, including three months' Dressership, eight guineas; for twelve months, including six months' Dressership, twelve guineas; for eighteen months, including twelve months' Dressership, eighteen guineas; for three years, including twelve months' Dressership, twenty-five guineas; for twelve months' additional Dressership, during the above three years, five guineas; for twelve months' Dressership after the expiration of the above three years, eight guineas.

The Fee for Instruction in Vaccination and the Certificate is One Guinea.

The Pupils enter and dress under all the Surgeons.

A Medical and Surgical Tutor is appointed to assist the Junior Students. Fee to the Class, *Two Guineas.*

Several of the Lecturers receive resident Pupils.

Further information may be obtained from Mr. ADAMS, 10, Finsbury Circus, Mr. HUTCHINSON, 4, Finsbury Circus, or on application at the College.

WORKS IN MEDICINE AND SURGERY

BY THE

Physicians and Surgeons of the London Hospital.

DR. FRASER,
Senior Physician to the Hospital,

A TREATISE ON PENETRATING WOUNDS OF THE CHEST, Founded on Personal Observation in the Field. 148 pp. 8vo., cloth, price 5s.

DR. RAMSBOTHAM,
Lecturer on Midwifery, and late Obstetric Physician to the Hospital,

THE PRINCIPLES AND PRACTICE OF OBSTETRIC MEDICINE AND SURGERY. Illustrated with One Hundred and Twenty Plates on Steel and Wood; forming one thick handsome volume. Fourth Edition. 8vo., cloth, 22s.

LONDON: JOHN CHURCHILL AND SONS.

DR. HERBERT DAVIES,
Physician to the Hospital, and Consulting Physician to the Royal Infirmary for Diseases of the Chest,

ON THE PHYSICAL DIAGNOSIS OF DISEASES OF THE LUNGS AND HEART. Second Edition. Post 8vo., cloth, 8s.

LONDON: JOHN CHURCHILL AND SONS.

DR. MORELL MACKENZIE,
Assistant-Physician to the Hospital, and Physician to the Hospital for Diseases of the Throat,

THE LARYNGOSCOPE: ITS USE IN DISEASES OF THE THROAT, with an Appendix on Rhinoscopy. Fully Illustrated, cloth, 5s. New Edition, October 1st.

LONDON: ROBERT HARDWICKE.

JOHN ADAMS, F.R.C.S.,
Senior Surgeon to the Hospital, &c.,

ON DISEASES OF THE PROSTATE GLAND. 8vo., Second Edition, price 5s.

LONDON: LONGMAN, AND CO.

On October 1, 1865, was published,

CLINICAL LECTURES & REPORTS

BY THE

Medical and Surgical Staff

OF THE

LONDON HOSPITAL.

EDITED BY

Dr. ANDREW CLARK, Dr. DOWN, Mr. HUTCHINSON, and Mr. MAUNDER.

VOL. II.

WITH FIVE LITHOGRAPHS AND NUMEROUS WOODCUTS,
8vo., bound in cloth, pp. 420.

CONTENTS.

Price to subscribers, 6s.; to non-subscribers, 7s. 6d.

LONDON: JOHN CHURCHILL & SONS.

This Day is Published,

CLINICAL LECTURES & REPORTS

BY THE

𝕸𝖊𝖉𝖎𝖈𝖆𝖑 𝖆𝖓𝖉 𝕾𝖚𝖗𝖌𝖎𝖈𝖆𝖑 𝕾𝖙𝖆𝖋𝖋

OF THE

LONDON HOSPITAL.

EDITED BY

Dr. ANDREW CLARK, Dr. DOWN, Mr. HUTCHINSON,

and Mr. MAUNDER.

VOL. III.

WITH LITHOGRAPH AND SEVERAL WOODCUTS.

8vo., bound in cloth. pp. 516.

CONTENTS.

Price to subscribers, 6s.; to non-subscribers, 7s. 6d.